HIGHLIGHTS 2009

endings & beginnings

CPWR
THE CENTER FOR CONSTRUCTION
RESEARCH AND TRAINING

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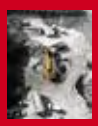


ON THE COVER

Endings photo: Steve Marcus/Las Vegas Sun
Fireworks explode over the Aria hotel-casino marking the official opening of the $8.5 billion CityCenter project, Dec. 16, 2009, in Las Vegas. CPWR coordinated training for more than 6,000 site workers and conducted a site safety assessment on the jobsite during 2008. In 2009, CPWR released four reports with recommendations for improving site safety. Twelve workers were killed during an 18-month building boom along the Las Vegas Strip. Six deaths occurred on the CityCenter site.

Beginnings photo: istockphoto
Moving the earth, making way for the foundation is the beginning of most construction projects.

Foreword to Highlights 2009

"Endings and Beginnings," the title of our 2009 *Highlights*, is a familiar theme in the construction industry. We all know the flow of a job – how one trade begins work just as another trade is finishing its job. We see the theme reflected in the schedule posted at the jobsite trailer. We see familiar faces when we start a job, knowing that they're wrapping up and will soon depart. Perhaps the theme is best expressed by the ribbon-cutting ceremony: Workers have completed the structure that began as a set of drawings and have connected the systems to power the lights, HV/AC, electronic equipment, phones, plumbing and elevators. But when the ribbon gets cut, the next set of tasks begins – leasing the space and servicing the building and its occupants. That's illustrated by the cover photograph from Las Vegas' CityCenter project, which opened Dec. 16, 2009.

CPWR experienced its own endings and beginnings in 2009. CPWR completed its five-year national cooperative grant cycle (2004-2009) with the National Institute for Occupational Safety and Health (NIOSH) and won a new five-year award (2009-2014). This cooperative agreement between NIOSH and CPWR is the centerpiece of applied research in the U.S. construction industry, which investigates the causes – and prevention – of construction fatalities, injuries and illnesses in our nation. In this *Highlights*, you'll find a brief description of the research projects coming to a close and those just beginning in 2009.

In addition to its research in 2009, CPWR also submitted a proposal to the National Institute for Environmental Health Sciences (NIEHS) for funding to continue environmental hazards and disaster response training. NIEHS grants will be awarded in 2010. Given the caliber of programs described on Pages 20-25, I anticipate this work will continue for another five years, maintaining CPWR's hazardous waste and safety and health training operations through 2015. In addition to providing expert training to our workforce, CPWR staff offer workshops on emerging topics, such as "green" construction – a subject of growing importance in this new decade.

CPWR also assists workers formerly employed at DOE nuclear facilities through its employment verification program, supported by a grant from the Department of Labor. The grant enables CPWR to search records and document workers' DOE employment. Without proof of employment, a worker sickened from exposure to hazardous materials at DOE nuclear sites cannot qualify for compensation for work-related illness. One worker's dilemma was profiled in a TV news program. Read more about this and CPWR's BTMed program beginning on p. 26.

One last ending/beginning is critical, because it involves you. Just as the completed building needs someone to staff and run it, so CPWR's research program needs people in the building trades and construction management to start where the researchers left off: putting their findings to use on our jobsites. Millions of our federal tax dollars fund the research that identifies practical steps workers and contractors can take to make worksites safer. Training programs, videos, Hazard Alert cards, technical reports and more are available for free or at low cost on www.cpwr.com. Safety managers and contractors can find supplementary handouts and toolbox talks in our electronic library of safety and health, www.elcosh.org. A new online collection of safety and health photos is now available, again at no charge.

If you can't find the answers to your questions, contact CPWR. You can be directed to experts or receive the tools you're seeking. Who knows, your question may inspire a researcher to undertake a new Small Study, partnering with you to find answers to the questions that led you to seek help in the first place.

Of course, not all questions have easy answers. Why must we continue to lose an average of four workers a day on U.S. construction sites? Why do aging workers and Hispanics die on U.S. worksites with greater frequency than other workers? And why was there no mention of the 12 workers killed in an 18-month building boom on the Las Vegas Strip when CityCenter opened to such fanfare?

While I can't answer those questions, I can assure you of this: CPWR will continue working diligently to find the best ways to ensure the health and safety of our workforce. I ask that you do your part, whatever your level of responsibility, to make U.S. worksites the safest, most healthful, and most productive in the world.

Meanwhile, we invite you to celebrate CPWR's "Endings and Beginnings" highlighted in these pages.

Mark H. Ayers
President, CPWR
President, Building and Construction
Trades Department, AFL-CIO

endings 2004-2009
beginnings 2009-2014

Research

CPWR ended one five-year grant cycle and began another in 2009. With the renewed national cooperative grant, NIOSH again designated CPWR as its National Construction Center.

endings

Research Projects 2004-2009

- Analysis and Control of Crane and Aerial Lift Hazards
- Blood Lead Levels
- Chronic Obstructive Pulmonary Disease (COPD) Risk
- Development of a "Wiki" Site for Ergonomics Diffusion
- Engineering Controls for Silica Dust and Welding Fume
- Evaluating Effectiveness of Hazard Awareness Training
- Handheld Device to Conduct Electrical Inspections
- Improving Safety Culture through Effective Communication
- Ladder Falls
- Leading Edge Decking System
- National Construction Workers Survey
- Preventing Falls Among Residential Carpenters
- Preventing Nail Gun Injuries
- Reducing Injuries Among Masonry Workers
- Reducing Silica and Noise Exposures during Concrete Cutting and Grinding
- Refining the Overhead Drilling Device
- Safety and Health of Hispanic Construction Workers
- Tracking Safety and Health Trends
- Training Day Laborers in Safety and Health
- Work-Related Disease Among Sheet Metal Workers
- Small Studies

beginnings

Research Projects 2009-2014

- Construction Solutions
- Dissemination/Communications/r2p
- Highway and Bridge Construction Drilling
- Isocyanate Exposure
- Nail Gun Injuries
- Organization of Work
- Participatory Ergonomics
- Performance Metrics
- Residential Fall Protection
- Safety and Health Disparities
- Safety and Health Tracking Plan
- Safety Culture/Safety Incentives
- Silica and Noise Controls
- Sustainable Construction
- Vulnerable Worker Training and Safety Liaisons
- Worker Health Across the Lifespan
- Small Studies

endings

beginnings

CPWR researchers have been seeking ways to improve worker safety and health since the first NIOSH grant award in 1990.

endings
2004-2009

Research projects from the previous grant cycle continue to generate findings and publish results. The fresh approaches to fall hazards, safety culture, injury and illness prevention, and reducing MSDs can be used to make jobsites safer for years to come.

Analysis and Control of Crane and Aerial Lift Hazards

Lead Researcher: David V. MacCollum, PE, CSP

A major aerial lift or crane failure occurs almost every month. Most often, the incident can be traced to equipment design hazards, not operator error, according to research by crane safety expert David MacCollum. Mr. MacCollum, who has analyzed thousands of crane and aerial lift failures, identified five prominent hazards inherent to both machines: 1) contact with power lines, 2) overload, 3) faulty or unguarded operator controls, 4) blind zones, and 5) inadequate access.

Expecting crane and lift operators to overcome design hazards is unreasonable. Instead, the focus must be on how to apply engineering principles to eliminate hazards inherent to machine design. For instance, use of a Load Moment Indicator (LMI) alerts the operator of an impending overload. Placing guards around control panels is a simple measure that can prevent inadvertent operation of the equipment.

According to Mr. MacCollum's research, implementing engineering solutions requires two actions:

1. Engineers must develop a methodology that systematically identifies design hazards so engineering solutions can be incorporated into the design of equipment.
2. Equipment designers, manufacturers, and rental firms must partner with the construction industry to develop cost-effective and safer equipment.

Blood Lead Levels

Lead Researcher: Janie Gittleman, PhD, CPWR

Construction workers exposed to lead on the job face serious health risks, including infertility, miscarriages, and damage to the nervous system or kidneys. In the early 1990s the National Institute for Occupational Safety and Health (NIOSH) established the Adult Blood Lead Epidemiology and Surveillance (ABLES) program to support state-based efforts to collect work-related blood lead levels (BLLs). But a breakdown of the data specifically for the construction industry was not available until NIOSH contributed to a special analysis of construction for 2003 and 2004 for the fourth edition of the *Construction Chart Book*.

According to the analysis, construction workers accounted for 17 percent of the total cases of BLLs at or above 25 micrograms per deciliter (µg/dL), which is disproportionately high given that construction employment makes up about 7 percent of the total workforce. Yet even this number is probably low, due to non-compliance among employers to test and report workers' blood lead levels. BLLS above 10 µg/dL are now thought to pose a serious health risk. The risk of lead exposure is most acute for construction workers engaged in building finishing, highway, street and bridge repair, and utilities. Maine, Massachusetts, New York, and New Jersey had higher rates of elevated BLLs than other states, possibly due in part to the proportion of the states' aging infrastructure and housing stock. Another possible cause is the long-standing and active surveillance programs in these states. The large number of construction workers with elevated BLLs underscores the need for continued efforts to identify, classify, and target prevention efforts towards construction workers engaged in high-risk activities.

Research Team: NIOSH; 28 State Health Departments.

Chronic Obstructive Pulmonary Disease (COPD) Risk

Lead Researcher: John Dement, PhD, Duke University

Dr. Dement and his colleagues surveyed the occurrence of chronic obstructive lung disease (COPD) in 10,000 sheet metal workers and nearly 20,000 construction workers who had been employed at Department of Energy (DOE) sites. The researchers collected medical screening data and analyzed data on a variety of occupational factors, such as exposure to asbestos and silica, and personal habits such as smoking. Although COPD is often manifested as emphysema or chronic bronchitis, the lung disease is a diagnosis given to conditions that make breathing labored. The findings take into account the health effects of smoking.

Key Findings:

- DOE cement masons, brick masons, and plasterers had a COPD prevalence of 24.0 percent, much higher than the overall prevalence of 15 percent among the entire DOE study population.
- For the DOE workers, COPD risk was linked with exposure to asbestos, welding fumes, silica, and cement dust.
- The DOE data suggest that COPD risk is also linked exposures to solvents while fueling trucks and equipment and while mixing and applying paints.
- Sheet metal workers had an overall COPD prevalence of 9.8 percent. Welding tasks and tasks that produce cement dust appear to pose the greatest risk of developing COPD in these workers; however, these analyses are ongoing and results preliminary.

CityCenter Site Safety Assessment

Lead Researcher: Janie Gittleman, PhD, CPWR.

In 2008, CPWR conducted a site safety assessment of the largest private commercial construction development in U.S.

Preventing Falls

Among Residential Carpenters

Falls from heights account for 35 percent of all construction deaths. The percentage is even higher in residential construction, where falls account for nearly half of work-related deaths. For the past five years, Dr. Bradley Evanoff and his research team at Washington University have worked with the Carpenters Joint Apprenticeship Program (CJAP) in St. Louis to reverse this trend, through improved fall prevention training programs for apprentice residential carpenters. Their early research uncovered some stark findings:

- More than half of surveyed apprentices knew a co-worker who had fallen from a height in the previous year.
- 16 percent had themselves fallen from a height in the past year.
- The most common source of falls was ladders, which were involved in 29 percent of falls.
- Carpenters think ladders are safe!

Dr. Evanoff and the research team began the project by assessing the fall prevention training needs of apprentices through focus groups, worksite audits by retired skilled carpenters, and a survey of more than 1,000 apprentices. They found that apprentices prefer to learn by doing and like to hear real-world stories from experienced carpenters. The team then worked with the CJAP instructors to revise the curriculum. The new program provided more hands-on practice and group discussion. As part of the new training, apprentices built sections of a "model home," rating the tasks from least to most hazardous. In one segment, the apprentices identified hazards and preventive measures as they worked on pulling up a floor. Throughout the project, the team also worked closely with leadership from the Carpenters District Council and the Home Builders Association of Greater St. Louis.

In 2009, the researchers evaluated the revised fall prevention training. They surveyed newly trained apprentices about their safety behaviors, and arranged to have retired skilled carpenters conduct audits at sites where the apprentices worked. In all, nearly 1,000 apprentices were surveyed and about 200 worksite audits were conducted.

After going through the revised training program, apprentices increased their worksite safety behaviors by 22%. Self-reported safe use of ladders increased by 50%.

Key Findings:

- Apprentices reported feeling more confident in their ability both to perform work tasks at heights and to prevent falls from heights, as a result of the training.
- Apprentices' self-reported safe use of ladders increased by about 50 percent.
- The worksite auditors observed drastic improvements in priority training areas, such as avoiding work on the top plate of the ladder, use of warning lines to alert workers to unprotected edges, and truss setting.
- The audit data evaluated so far show that apprentices increased their overall compliance with measured safety behaviors from 59 percent to 75 percent.

Despite a decrease in the number of active apprentices due to the downturn in the construction industry, 78 revised training courses have been delivered to a total of 1,038 apprentices in 2009. Still, apprentices continue to report barriers to implementing safe behaviors at the worksite, such as the specific work situation, time, and lack of equipment.

The work has led to a one-year funded project from the Heartland Center for Occupational Health and Safety to measure the effectiveness of fall prevention technology at residential worksites. (See also p. 17 for a description of the team's new project.)

history, CityCenter in Las Vegas, and analyzed the safety climate of the site through a survey of workers, foremen, site superintendents, and senior management. Selected results were published in the CPWR *Highlights 2008*. Then in February 2009, CPWR released four comprehensive technical reports on the site after the reports were reviewed by Perini Building Company, the general contractor for the project, and the Southern Nevada Building Trades. All reports are published on CPWR's Web site and eLCOSH. The CityCenter development officially opened Dec. 16, 2009.

Since the reports' release, researchers have used data collected to examine five additional topics: differences in responses

to the safety climate survey by English-speaking and non-English speaking workers, evaluation of safety climate responses across trades, characteristics of safety behavior by trade, lessons learned from open-ended survey questions, and prediction of safety behaviors based on different organizational levels. These topics and more will be included in an upcoming special issue of the National Safety Council's *Journal of Safety Research* focusing on construction due out this spring.

Research Team: Elizabeth Haile, MS, Pete Stafford, Don Ellenberger, CPWR; Paige Gardner, Konsantin Petkov Cigularov, PhD, Colorado State U; Matt Gillen, CIH, Max Kiefer, CIH, NIOSH; Mark Fullen, EdD, Wayne Lundstrom, Steve Bowers, CSP, Lisa Kane, WVU.

Development of a "Wiki" Site for Ergonomics Diffusion

Lead Researcher: Marc Weinstein, PhD, University of Oregon (now at Florida International University)

In the course of their masonry ergonomics research, Dr. Weinstein and his team identified dozens of measures that likely reduce musculoskeletal disease (MSD) risk and injuries in construction workers. These include alternative means and methods of production as well as new tools and equipment. Many of these innovations are not broadly known, and though they appear to effectively address MSD risks, most have not yet been scientifically validated. Moreover, given the large number of innovations identified and the cost of validating each one, most will likely never be scientifically validated.

To close this knowledge gap, the researchers developed an interactive Web site based on a "wiki" platform (http://oshwiki.org). Oshwiki.org provides easy access to nearly 100 innovations in construction ergonomics. The wiki platform not only allows researchers and practitioners the opportunity to comment on innovations, but users can also directly edit, amend, and make their own the contributions on the wiki. The wiki can also serve as a platform for open-source development tools (applets) that promote innovations in construction ergonomics. One such applet is the **masonry calculator**, a program developed by the research team. The **masonry calculator** allows users to determine the cost effectiveness of using open-ended concrete masonry units (CMU), also known as "H-blocks," as an alternative to the heavier closed-end CMUs, or "box-car" blocks, typically used on worksites. Should Oshwiki.org prove to be an effective means to diffuse new ideas about construction ergonomics, it can easily be extended to other areas in occupational safety and health.

Research Team: Jennifer Hess, PhD, University of Oregon; Sharon Garber, PhD, Consultant.

Engineering Controls for Silica Dust and Welding Fume

Lead Researcher: Pam Susi, MSPH, CPWR

The CPWR team investigating silica exposures and dust controls using commercially available devices made a startling find: vacuums used during tuck-pointing (replacing mortar between bricks) collected roughly 120 pounds of silica-laden dust per worker in a single day. Although such conditions pose a major health risk to workers, few cities and regions have codes requiring dust controls for masonry projects. To encourage widespread adoption of such codes, a CPWR/NIOSH national advisory group, led by project investigator Ms. Susi and Dr. Goldberg, developed a model specification for dust control when grinding and sawing masonry. The purpose is to protect employees, the public, the environment, and property from the harmful effects of dust and silica generated during work on masonry or concrete materials. The model code calls for using engineering controls located right at the source of the dust generation. The team is beginning dissemination of the model specifications in 2010.

Researchers discovered that dust control vacuums collected about 120 pounds of silica-laden dust per worker in one day.

Since OSHA passed a new hexavalent chromium standard in 2006, employers have shown much more interest in CPWR's study of welding fume exposures and the effectiveness of local exhaust ventilation (LEV). The CPWR data show that workers are frequently overexposed to metal fumes generated from welding, which can cause several debilitating diseases, such as asthma, manganese-induced Parkinsonism, and cancer. The good news is that the team has test data showing that proper use of LEV can significantly reduce welding fume exposures. For instance, in a study at a large pipe-fitter training center, training welders on the correct placement of the ventilation hood reduced hexavalent chromium exposure during stick welding by a range of 85.7 to 99.6 percent. Motivating contractors and workers to use the engineering controls is the goal of the team's ongoing dissemination efforts.

Research Team: Mark Goldberg, PhD, Hunter College; Robert Herrick, ScD, Harvard; Mike Flynn, ScD, UNC; John Meeker, PhD, University of Michigan; David Feldshcer, retired UA Local 120.

Evaluating Effectiveness of Hazard Awareness Training

Lead Researcher: Rosemary Sokas, MD, University of Illinois Chicago (now at OSHA, Washington, DC)

Not all safety and health training programs are equal. To learn more about what constitutes effective training, Dr. Sokas conducted separate surveys of trainers and trainees in the construction industry. In the Web-based trainer survey, union-based outreach instructors were asked to evaluate materials used in Smart Mark, the OSHA 10-hour hazard awareness program designed for construction workers. Participants in union-delivered safety training completed a baseline survey and a follow-up telephone survey three months later.

Key Findings

- Among 366 trainers, more than 80% identified falls from ladders and

ergonomic hazards (bending, stooping, and lifting) as important concerns for their trainees.

- More than one-third of trainers taught workers whose primary languages were not English.
- Trainers estimated more positive effects of training on safety activities under workers' control as compared with those under employers' control.
- Follow-up contact with trainers may be an indicator of training effectiveness, an informal means of workplace intervention, or both. This concept should be further explored.

- Of 175 trainees who participated in a baseline survey, 127 were U.S. born and 41 were born in Mexico. Safety knowledge and attitude improvements were measurable at three months in both groups.
- Features of both union membership and training may affect safety behaviors. Further study should explore how this knowledge can be applied to reduce the disproportionately high rate of work-related injuries among foreign-born Hispanic workers.

Research Team: Emile Jorgenson, MPH, Leslie Nickels, MEd, Weihu Gao, MS, Janie Gittleman, PhD, Kristin Rankin, MPH, Christina Trahan, CIH.

Handheld Device to Conduct Electrical Inspections

Lead Researcher: Mark Fullen, EdD, West Virginia University

Dr. Fullen and his research team wanted to know whether conducting electrical inspections using a handheld digital tool, similar to a Blackberry, could improve safety performance on construction sites. The team collaborated with CPWR to revise its PDA-based safety inspection software, which includes guidance on OSHA electrical standards. A key feature of the tool is its ability to generate site-specific hazard reports for contractors.

One unionized construction worker was selected to attend the OSHA 3090 electrical standards course and was also trained on use of the handheld tool to

Refining the Overhead Drilling Assist Device

Demand is brisk for the novel overhead drilling device developed by Dr. David Rempel and his research team. It has become so popular that an electrical contractor plans to build enough of the devices to serve a workforce of up to 1,600 electricians. Dr. Rempel and his colleagues from UCSF and Simon Fraser University have perfected the design over the past five years to assist construction workers with overhead drilling into concrete and metal ceilings. Such workers face many risks, including silica dust exposure, falls from ladders, acute injuries to the wrist when the drill seizes, and chronic musculoskeletal disorders of the wrist, forearm, shoulder, and back. The device enables the worker to perform the drilling from the ground without looking up, thereby reducing the high forces and awkward postures typically applied during the task.

Dr. Rempel developed and refined the device by working with building trades unions and contractors. The device has received rave reviews from workers, who report more comfortable postures, as well as reduced muscle fatigue and hand vibration while using the device. Now the research team has data to validate the workers' subjective responses. The team measured ergonomic factors such as force and musculoskeletal strain, with and without device, and found that the device frequently outperformed the usual drilling method. For instance, the average hand forces measured during drilling with the overhead device were about 10 times less than hand forces with the traditional drilling method. Another measurement showed how the device reduces shoulder muscle strain and fatigue: the percent time with the shoulder flexed or abducted stretched to greater than 60 degrees was 21% with the device, compared to 40% with the usual drilling method. Also, there was significantly less head extension with the device compared to the usual method.

Dr. Rempel and his research team have been seeking collaborators to

bring this product to market. Now that dream is coming closer to reality. Cupertino Electric, a regional contractor, has recently invested resources in improving the device design and plans to build many of the devices so that they will be available at all of their construction sites. This electrical contractor employs 900 to 1,600 electricians (IBEW Local 332). Cupertino Electric was introduced to the device at one of Dr. Rempel's presentations to the National Electrical Contractors Association. Their fabrication department has modified the device design and developed what they call the Upside-Down Drill Press. They have also developed a lightweight version of the device for use in a scissor lift, called a Pogo-stick Upside Down Drill Press.

After testing the tool, many contractors have asked to purchase it.

The modified devices have received positive reviews by several construction workers. Cupertino Electric is interested in working with Dr. Rempel to formally evaluate the two new designs on construction sites.

Trials of the device have been so positive that many contractors in addition to Cupertino Electric have asked to purchase the tool. Dr. Rempel receives an average of two enquiries a week about how to obtain the device. He currently works with a small tool fabricator who produces one or two devices each month.

conduct safety inspections. This trained inspector then conducted 40 inspections between December 2008 and May 2009, during construction of a $19.4 million four-story commercial building in Parkersburg, West Virginia.

The inspections noted 1,804 violations of OSHA regulations and the audit software generated violation reports sorted by contractor. In preliminary focus group findings, electrical safety personnel and the trained electrical inspector both believed the tool-based inspections increased contractor accountability for safety, and improved electrical safety compliance on the site. Over time, violation rates decreased and correction rates improved. The researchers concluded that safety management and perhaps safety culture were enhanced through the use of this inspection tool.

Improving Safety Culture through Effective Communication

Lead Researcher: Peter Chen, PhD, Colorado State University

Dr. Chen and his research team developed and field-tested programs designed to train workers, foremen, and superintendents to stop the chain of events leading to an accident. The training emphasized discussing worksite safety issues respectfully, sharing near misses, and providing constructive feedback.

The team delivered the training at three firms: Saunders Construction, in Denver; Temp Control Mechanical in Portland, Oregon; and Nooter Construction in Philadelphia. In follow-up surveys, the researchers found that knowledge and safety communication skills were generally increased through the training program. One contractor experienced a statistically significant decline in the number of work-related injuries during the six months following the training. Foremen found the training boosted their confidence in recognizing good work, and workers reported they felt more comfortable sharing their mistakes with foremen.

Research Team: John Rosecrance, PhD, April Smith, MS, and others at Colorado State University; Partners: Pipefitters Locals 208, 290, & 420, Mechanical Contractor Associations in Denver, Portland, and Philadelphia, and Pinnacol Assurance.

Ladder Falls

Lead Researcher: Melissa Perry, ScD, Harvard University

The construction industry experiences the largest number of deaths from ladder falls among U.S. industries, accounting for 52 percent of such deaths in the period 1981-2003. Dr. Perry and her research team aimed to curb this trend, first identifying the circumstances leading to ladder falls and then developing a tool for assessing ladder fall hazards on worksites. The team's ultimate goal is to develop targeted ladder fall prevention strategies.

Construction workers suffered 52 percent of all ladder fall deaths among U.S. industries in the period 1981-2003.

According to an initial evaluation of data from several large occupational surveys, the researchers found that 51 percent of fall injuries occurred on step or trestle ladders and 40 percent on extension ladders. In one-quarter of the cases, the ladder slipped out at the base or bottom, and in another 20 percent the worker lost balance for another reason. Among identifiable underlying causes, improper ladder setup was most common, accounting for 18.2 percent of cases.

The team developed a hand-held digital tool to measure worksite compliance with ladder use best practices. The tool contained checklists in four categories: ladder condition, setup, moving on a ladder, and completing tasks from a ladder. The tool was used to conduct assessments at 18 worksites, yielding observations of 1,151 pieces of equipment used to reach heights (stepladders, extension ladders, lifts, etc.). The sites were found to have stepladders of good quality and their setups regularly had spreaders locked. However, compliance with some best practices was lacking, such as having hands free while climbing (46 percent compliance). The researchers concluded that the tool offers a practical method to quantify best practices associated with ladder use that can ultimately inform targeted intervention efforts.

Research Team: Jack Dennerlein, PhD, and Christopher Ronk, MS, Harvard University; David Lombardi, PhD, Jaeyoung Kim, MS, Liberty Mutual Research Institute; Partner: Tom Schroeder, U.S. Consumer Product Safety Commission.

Leading Edge Decking System

Lead Researcher: Michael McCann, CPWR

CPWR and safety consultant Dan Paine of Innovative Safety analyzed a fall prevention system for metal decking in steel buildings designed and used by Capco Steel Inc., of Providence, R.I. Workers tie off on cables above their heads that are secured to steel columns with pre-punched holes. Ideally, the system would virtually eliminate fall hazards for this job with little or no loss in productivity.

The research took a surprising turn when researchers discovered problems in preventing the cables from sagging, necessitating new engineering and testing to resolve the problem. At present, researchers are seeking an experienced decking crew to perform site visits and test the altered system. Once the changes are completed, the planned training DVD and manual to aid contractors, foremen and workers in the equipment's installation and use will be completed, scheduled for 2010-2011.

National Construction Workers Survey

Lead Researcher: Dale Belman, PhD, Michigan State University

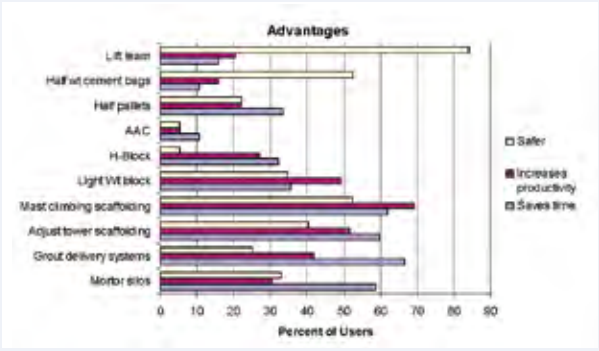
The National Construction Workers Survey aims to shed light on a number of crucial but poorly understood aspects of the construction labor force: where workers are recruited, how they obtain training, how their work and compensation are structured, and their work attitudes and motivations. Developed by Dr. Belman and Dr. Janie Gittleman, the survey will collect representative information on training, compensation, skills, educational

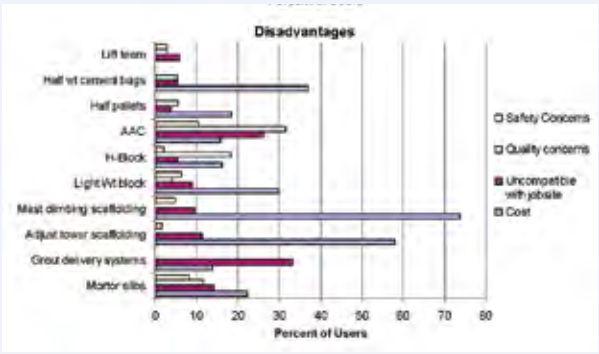
Reducing Injuries Among Masonry Workers

A masonry worker handling an average of 200 concrete masonry unit (CMU) blocks per day, weighing 38 pounds each, lifts the weight of more than five Ford F-350 pick-up trucks each week, or two and one-half fully loaded Boeing 747-100s each year. So it's not really surprising that masonry workers have the highest rate of back injuries causing days away from work among all the construction trades. However, research by Drs. Dan Anton, Jennifer Hess and colleagues identified a variety of innovations being used around the country that show promise in reducing the risk of back injuries and other MSDs among masonry workers.

The innovations fall into three categories: materials, such as H-block, lightweight block, and autoclaved aerated concrete (AAC); work practices, such as working in lift teams; and equipment, such as grout delivery systems and adjustable scaffolding. Alternative materials such as H-block and lightweight block reduce stress to the upper extremities and low back. Adjustable height or mast climbing scaffolds can help prevent awkward back postures when used for placing work materials at optimum heights. A video of two-person teams to lift heavy concrete masonry units is noted on p. 32, "Products."

In a survey of masonry contractors around the country, the researchers found that the main advantage driving use of an innovation was time savings, followed closely by increased productivity. Improving safety was usually the least important "advantage" noted by contractors from among a list provided in the survey. Increasing safety usually ranked third, except for the use of half-weight cement bags and two-person lift teams with 12-inch block, where safety was the most important advantage. Cost was the greatest disadvantage for equipment such as mast climbing scaffolding and mortar silos, while quality concerns were the greatest disadvantage for H-block and AAC. As the charts show, contractors use various innovations despite their disadvantages. The researchers concluded that masonry contractors are beginning to innovate in the use of new equipment, materials, and work practices, a trend that should help reduce injury risks to masons.





The above charts illustrate the advantages and disadvantages of various ergonomic innovations reported by masonry contractors.

background, safety conditions, and occupational injuries and health for the construction labor force.

The survey will provide a unique source of insight into the relationship between training experience and safety and health outcomes, among other critical issues. A particular strength of the survey is that it will assess the depth and breadth of respondents' knowledge of their primary trade using task "batteries"– groupings of representative tasks for entry-level and experienced workers in each of 19 trades. The task batteries were developed with input from construction trainers. In order to administer the survey, the researchers are seeking financial support from foundations, government bodies, and other organizations interested in construction labor issues.

Research Team: Janie Gittleman, PhD, CPWR.

Preventing Falls Among Residential Carpenters

Lead Researcher: Bradley Evanoff, MD, MPH, Washington University, St. Louis

This study is highlighted on p. 7.

Research Team: Vicki Kaskutas, OTD, Washington University School of Medicine, Program in Occupational Therapy; Ann Marie Dale, PhD, Washington University School of Medicine, Division of General Medical Sciences; Hester Lipscomb, PhD, Duke University; John Gaal, EdD, Carpenters' District Council of Greater St. Louis and Vicinity; Mark Fuchs, BS, St. Louis Carpenters' Joint Apprenticeship Program.

Preventing Nail Gun Injuries

Lead Researcher: Hester Lipscomb, PhD, Duke University

Although nail gun injuries remain an under-recognized problem among residential carpenters, considerable progress has been made in reducing such injuries since Dr. Lipscomb began her research in 2000.

In surveys of carpenter apprentices, the lifetime prevalence of nail gun injuries was 22.6 percent in 2008, substantially lower than the rate of more than 44 percent in 2005. Injury rates per hours worked and per hours of actual tool use have both declined since 2005. In addition, a larger proportion of carpenters now seek medical care for nail gun injuries than at the beginning of the project.

With early training and increasing use of nail guns with sequential triggers, injury rates have declined over 50 percent. The sequential trigger by design avoids inadvertent discharge of nails which is the most common cause of injury. In 2006, over half of the hours apprentices spent nailing involved use of a sequential trigger for the first time.

Nail gun injury rates decreased when use of sequential triggers and training increased.

What has not changed is the higher rate of injuries with the contact trip trigger gun, which has a two-fold higher injury rate than the sequential trigger gun even after considering training and experience. Inexperienced carpenters without training also continue to have a high injury rate. Nail gun injury rates still remain much higher than recognized, partly due to the fact that many injuries go unreported. For more on Dr. Lipscomb's new efforts to reduce nail gun injuries through outreach and training, see p. 16.

Partners: James Nolan and Dennis Patterson, Local 2119 and 1310; Carpenters District Council of Greater St. Louis and Vicinity; Home Builders Association of Greater St. Louis.

Reducing Injuries Among Masonry Workers

Lead Researcher: Laura Welch, MD, CPWR

This study is highlighted on p. 11.

Research Team: Dan Anton, PT, PhD, Eastern Washington University; Jennifer Hess, DC, PhD, MPH, University of Oregon; Ryan Mizner, PhD, Eastern Washington University; Marc Weinstein, PhD, Florida International University.

Reducing Silica and Noise Exposures during Concrete Cutting and Grinding

Lead Researcher: Susan Woskie, PhD, University of Massachusetts-Lowell

Dr. Woskie and research partner Susan Shepherd, ScD, worked with the Laborers Union and its New England Laborers Training Academy to evaluate ways to reduce silica and noise exposures when cutting reinforced concrete pipe with a gas-powered chop saw.

For the noise study, the researchers wanted to determine whether the blade design affected noise levels during gas saw operations. In tests with five different blades, the team found no difference in decibel levels during saw operation, and concluded that the saw's very noisy two-stroke motor was the main noise source. The testing revealed that noise exposure differences among saw operators depended mainly on how fast the saw was running during the cutting. The researchers are currently studying how work practices can reduce noise exposures from these very noisy tools.

For silica dust control, the team found that using water is more effective than built-in dust control systems. The tests showed that using water during concrete cutting reduces respirable dust exposure by an average of 87 percent, but there was no statistical difference in dust concentrations for different water flow rates. The researchers are working on recommendations for using water spray pumps to achieve optimal dust control. By contrast, the dust exhaust systems did not reduce dust levels as effectively as wetting. Tests on one gas saw with a built-in dust exhaust system yielded average respirable dust levels that were about twice as high as the levels found during wetting.

The team also gathered information and insights from laborers and carpenters on jobsite activities and exposures, including silica, noise, organic solvents, and welding fumes. Researchers can use the data to link potential hazards with various tools and construction tasks.

A case study examining the incentives and barriers to the use of dust controls by a concrete contractor on a large building project was also completed and is in the publication process.

Research Team: Susan Shepherd, ScD, University of Massachusetts-Lowell; Partners: New England Laborers Training Academy, LIUNA Local 609, Suffolk Construction, S&F Concrete.

Refining the Overhead Drilling Device

Lead Researcher: David Rempel, MD, MPH, University of California, San Francisco

This research is highlighted on p. 9.

Research Team: Alan Barr, MS, Demetra Star, MPH, Ira Janowitz, MS, UCSF; Billy Gibbons, MS, MBA; David Harrington, MS, California Dept. of Public Health.

Safety and Health of Hispanic Construction Workers

Lead Researcher: Xiuwen (Sue) Dong, DrPH, CPWR

With the steady influx of Hispanic workers on construction sites, this population was a major focus of the Data Center's work. The data point to significant disparities between Hispanics and their non-Hispanic counterparts. Here are some key findings about Hispanic construction workers:

Employment

The number of Hispanics employed in construction dropped by one-half million workers from its peak in early 2007 to the end of 2008. Due to the economic slump, the trend of Hispanic employment in construction has changed from increasing to decreasing for the first time since 1990. Nevertheless, about 30% of all blue-collar construction workers are Hispanic.

Fatal Falls and Nonfatal Injuries

Fatal falls account for nearly 40% of the total deaths among Hispanic workers,

much higher than 31% for white, non-Hispanic workers. Hispanic construction workers were 28% more likely than their white, non-Hispanic counterparts to experience nonfatal work-related injuries.

Access to Healthcare

Among workers having insurance, only 24.5% of the payment for insured Hispanics was paid by private insurance compared with 60.7% for insured whites. Only 30% of Hispanics reported they had a usual source of care provider – less than half of that for white workers. Healthcare use for Hispanic adults was more likely to be driven by necessity and severity of conditions, thus resulting in more emergency room visits and inpatient care.

In 2009, the Data Center created a new type of publication, CPWR Data Briefs, which are one-topic analyses of current data modeled after CPWR's popular *Construction Chart Book*. The first data brief, Hispanic Employment in Construction, was published in an electronic format and is available on the CPWR Web site.

Research Team: Alissa Fujimoto, MA, Rose Men, MS, CPWR.

Tracking Safety and Health Trends

Lead Researcher: Xiuwen (Sue) Dong, DrPH, CPWR

The CPWR Data Center monitors trends in construction employment, economics, and safety and health, using multiple public and private data sources. The Center's statistical reports are used by safety and health professionals, researchers, government officials and others. Some of the Data Center studies from 2009 are below.

Older Construction Workers

Construction workers aged 50 and older are much more likely to have poorer health than their younger counterparts. Among male construction workers who were 55 years or older, 41% had hypertension, 51% were overweight, and 30% were obese. Also, 25% of older male construction workers had arthritis-related diseases, 2.7 times higher than the prevalence among workers under 50, and 7.5% of older construction workers were diagnosed with diabetes, three times higher than the prevalence for workers under 50 years old.

Fatal and Nonfatal Injuries

The construction industry continues to account for a disproportionate share of work-related deaths in the United States, even though work-related death rates decreased from 1992 to 2007. Rates of nonfatal injuries and illnesses with days away from work declined for goods-producing industries overall, but rates for construction remained the highest of the four major production industries.

Falls are still the number one killer in construction. Being struck by an object, falls to a lower level, and overexertion in lifting continue to be the leading causes of nonfatal injuries.

Underreporting

The findings to date suggest that nonfatal construction injuries and illnesses are significantly underestimated and that this problem is worse in small establishments.

Research Team: Alissa Fujimoto, MA, Rose Men, MS, CPWR.

Training Day Laborers in Safety and Health

Lead Researcher: Michele Ochsner, Rutgers University

Dr. Ochsner partnered with New Labor, a worker center in New Jersey, and the Laborers Union to develop the Day Laborers Health and Safety Workbook and to evaluate this peer-led participatory approach to training. The program, which incorporates insights from focus groups of day laborers, meets the requirements for OSHA 10 training certification. Emphasizing worker participation, the training is customized to address the work situations and needs of day laborers. The team has provided training to more than 450 workers in six communities in northern and central New Jersey and has branched out to deliver training on fall protection methods and other safety skills to hundreds of day laborers waiting at corners for work.

This training approach is reaping benefits. The project evaluation found improvements in worker knowledge, attitudes, and work practices. Interviews with day laborers also suggest that workers who receive peer led health and safety training are not only more likely to protect themselves but also to engage crew leaders and supervisors in an effort to make changes and adopt safer work practices. In post-training surveys, day laborers report a significant increase in the use of personal protective equipment (PPE) and in self-protective work practices; reported injury rates have also declined. Day laborers also say they refer to the training materials and share the materials with friends and co-workers.

Researchers at the University of Illinois Chicago School of Public Health are working with the Rutgers and New Labor team on a NIOSH-funded project to disseminate the curriculum and participatory training methods to worker centers in Illinois, Ohio, Tennessee, and Wisconsin.

Day laborers gather for informal training produced by the Rutgers research team.

Work-Related Disease Among Sheet Metal Workers

Lead Researcher: Laura Welch, MD, CPWR

Dr. Welch's team analyzed data from more than 20,000 medical screenings of sheet metal workers, the largest asbestos-exposed group of workers ever studied in the United States. The screenings were conducted by the Sheet Metal Occupational Health Institute Trust (SMOHIT), a labor-management partnership concerned about asbestosis among its member workers.

Between 1986 and 2004, more than 18,000 sheet metal workers with 20-plus years in the trade were screened. Almost 10 percent had asbestosis and 21 percent had pleural (lung lining) scarring. A second exam given an average of 10 years later to those with no evidence of asbestos-related lung disease on first exam found that 5.3 percent had developed asbestosis and 12.3 percent had developed pleural scarring. The researchers also found that work in shipyards was more predictive of developing asbestosis over time than age, number of years in the trades, or smoking history.

A smoking cessation program within the screening program was extremely effective: 47 percent reported having quit. The typical "quit-rate" is only 2.5 percent.

A second study analyzed death statistics of these workers and found a high rate of deaths from lung cancer, asbestosis and mesothelioma, a cancer caused by asbestos exposure. Chest x-ray changes showing evidence of asbestosis were strongly associated with the risk of lung cancer, and the risk increased as the x-ray findings worsened.

Research Team: Elizabeth Haile, MS, CPWR.

Small Studies

CPWR's Small Studies program provides a unique way to improve workplace safety. The program funds pilot projects at a maximum of $30,000, and all projects have a turnaround time of one year. In the 17 years of its operation, the NIOSH-sponsored program has funded 74 projects with an impressive diversity of topics, applicants, and geographic representation. Research topics include equipment design, training evaluation, safety controls, workplace exposure to hazards such as manganese, and economics. The projects identify needed policy changes or potential interventions, and can help determine whether large-scale investigation is warranted.

The Healthy Aging for Workers Conference was funded through a Small Study grant.

During the past year, timely issues such as green school construction and the risk of isocyanate exposure in the construction industry were among the funded research. A Small Study grant funded the Healthy Aging for Workers Conference, Feb. 17-18, 2009, in Silver Spring, Md., which was convened by The Association of Occupational and Environmental Clinics (AOEC) and the Society for Occupational and Environmental Health (SOEH). Some of the key findings from the conference report are:

- All workers are aging, but those that are older continue to grow as a proportion of the working population.
- Many employers have jobs for which they want to attract and retain more experienced workers.
- Aging workers are severely injured more frequently than younger workers and require more days away from work to recover.
- Current knowledge about how to keep aging workers safe and healthy at work is insufficient.
- Targeted policies are needed to help aging workers maintain their ability to work.
- More attention must be paid to the quality and safety of the work environment, and how to achieve work-life balance.

Small studies will continue to be a fundamental part of CPWR's research program in the new grant cycle, 2009 to 2014.

Small Studies funded 2004-2009

- Development of an exposure database for construction
- Task-specific silica exposure during concrete polishing
- Inherently safer principles for construction
- Construction work organization: Developing a representative survey
- A case study of a water induction nozzle as a dust control for abrasive blasting
- Genetic testing for Beryllium: Worker knowledge, beliefs and attitudes
- Developing of design interventions for preventing falls
- Evaluation of trades and task-specific building trades safety training
- How mortar debris accumulation affects vacuum cleaner flow rates and pressure losses across vacuum cleaner filters
- Construction injury surveillance in Illinois
- Construction procurement policies that address health insurance – A cost analysis
- Aging workers conference report
- Occupational exposures, respiratory symptoms, and blood lead levels among Latino day laborers

beginnings
2009-2014

New projects explore emerging issues such as isocyanate exposure, measuring worksite safety, and pairing "green construction" with worker safety and health. Previous research delves into new areas to better understand construction hazards – and find ways to put new discoveries to work on jobsites.

Construction Solutions

Lead Researcher: James Platner, PhD, CIH, CPWR

Construction Solutions, www.cpwrConstructionSolutions.org, is a free, online site that identifies construction hazards by trade and task and gives solutions that can reduce or eliminate those hazards. The site, which is designed for workers, contractors, designers, and owners, receives more than 4,000 hits per month. CPWR aims to attract even more visitors to the Solutions site by linking it with the online resources of CPWR's electronic Library of Construction Occupational Safety and Health (www.eLCOSH.org).

In the initial phase, Construction Solutions focused on solutions for musculoskeletal diseases. The site is being expanded to include more information on fall prevention as well as methods for controlling exposures to hazardous dusts (such as silica) and welding fumes. CPWR is also field-testing a return-on-investment (ROI) calculator that can help address contractors' concerns about productivity and the costs of control solutions. CPWR is tracking usage patterns and page traffic in order to continuously update and improve the database.

More information about Construction Solutions can be found on p. 30.

Dissemination/Communications/r2p

Lead Researcher: Mary Watters, MFA, CPWR

When a researcher develops key findings that can improve the health and safety of construction sites, the findings need to be shared with those who can make changes on worksites. That's the job of CPWR's Communications Department. To that end, the Department will be working with researchers and research-to-practice (r2p) advisors to move awareness of an intervention toward acceptance of the need for change and an eventual change of a work practice to make jobsites safer. Since dissemination affects r2p efforts, the Department will be working with top staff within Academy for Educational Development (AED) to evaluate activities and products that will determine the best methods, channels and materials for educating and generating change.

In addition, the Department will take the major step of restructuring and redesigning CPWR's electronic Library of Construction Occupational Safety and Health, www.elcosh.org. Find out more about this on p. 30.

Highway and Bridge Construction Drilling

Lead Researcher: David Rempel, MD, University of California, San Francisco

Some workers on highway and bridge construction projects drill thousands of holes that are one inch in diameter and at least 12 inches deep. They use hand-held air-powered rock drills weighing as much as 60 pounds. This work puts extreme loads on the worker's upper body and back.

Drawing from their previous research on ergonomic problems caused by overhead drilling (see p. 7), Dr. Rempel and his colleagues at UCSF are now developing a device that can be used by workers who drill into concrete for highway and bridge repair. The purpose of the device is to reduce body fatigue and pain, curb muscle strain and injuries, and decrease hand vibration, while at the same time improving productivity. The team will take the drill support system through design, fabrication, and field-tests. The researchers will also study the user's hand vibration, arm and head postures and will measure how the device affects productivity. The ultimate goal is to promote the widespread use of such drill support systems by demonstrating that the devices curb injuries while also saving time and money.

With the new push for energy conservation steps such as blown-in insulation, an increasing number of construction workers may be exposed to harmful isocyanates while applying the insulation.

Isocyanate Exposure

Lead Researcher: Carrie Redlich, MD, Yale University

Isocyanate chemicals are well-known sensitizers and one of the most common causes of occupational asthma. The construction industry is now the largest market in North America for products containing isocyanates, including polyurethane (PU) foam insulation, roofing materials, coatings, and adhesives. Adding to health concerns, the latest push for energy conservation means that large numbers of construction workers are installing blown-in PU foam insulation and other PU products. Workers who handle such products can breathe in isocyanates and/or have skin contact with the chemicals.

Little is known about the usage of PU products in the construction industry and potential adverse health effects. Even less is known about the effectiveness of different strategies to reduce exposure, such as work practices and personal protective

equipment (PPE). Research conducted by Dr. Redlich aims to fill in the gaps. Her team will study respiratory and skin isocyanate exposures for various PU products and tasks in the construction industry. The study will focus on the most widely used products with potential isocyanate exposure risks, especially skin exposure. Dr. Redlich will also set up a surveillance program to track health effects and isocyanate exposures among construction workers who handle or work around PU products.

Using information gained from these studies, Dr. Redlich plans to launch a program to reduce isocyanate exposures in construction workers by disseminating information on the hazards of PU materials and strategies for preventing isocyanate exposure.

Minimizing Exposure to Dust and Fumes

Lead Researcher: Pam Susi, MSPH, CPWR

Engineering controls such as local exhaust hoods are key to protecting workers from harmful dusts and fumes. A CPWR project directed by Pam Susi aims to increase the use of such devices for protection against silica dust and welding fumes. Teams of manufacturers, researchers, and workers are collaborating to identify user-friendly and effective engineering control designs. The consortium includes Harvard School of Public Health, Hunter College of the City University of New York, the University of Puerto Rico and the International Masonry Institute (IMI). The team works with employees from unions representing bricklayers, pipefitters, boilermakers, sheet metal workers and ironworkers, plus the employer associations for these trades.

The team's activities include:

- developing programs to train workers on the proper use of engineering controls,
- creating a computer-based spreadsheet tool that helps contractors select the most cost-effective controls for their work sites,
- identifying and filling in data gaps on welding fume exposures in construction, and
- encouraging municipalities to adopt building codes that require silica dust control for masonry work.

Pending NIOSH approval.

Nail Gun Injuries

Lead Researcher: Hester Lipscomb, PhD, Duke University

Nail guns are a leading cause of injuries among residential carpenters. Using a nail gun with a sequential trigger, rather than a contact trip trigger, can cut acute injury rates by half, according to studies conducted by Dr. Lipscomb. The new project aims to curb nail gun injuries in residential construction by increasing use of tools with the safer sequential trigger and improved opportunities for nail gun safety training in the non-union sector of residential building.

In addition to continued work in the St. Louis area, the team is reaching out to residential contractors in West Virginia with a largely non-union workforce. The researchers will study the effectiveness of training programs in both union and non-union sectors. The team will also continue to monitor national nail gun injury patterns among consumers and workers, by tracking emergency department visits for nail gun injuries using the National Electronic Injury Surveillance System (NEISS) data for 2008-2012.

The researchers are launching a massive campaign to get the message out about nail gun safety, reaching out to policy makers, OSHA representatives, residential contractors, insurance companies, and the general public. The goal is to achieve policies that promote use of the safer sequential trigger mechanism and that define minimal training requirements for nail gun use.

Organization of Work

Lead Researcher: Peter Chen, PhD, Colorado State University

Leaders play a vital role in creating a culture of safety on construction sites, but what skills make an effective safety leader? Dr. Chen, who studies the organizational factors that shape safety culture and climate, will identify the specific leadership skills considered critical to promoting a safety culture in the construction industry. Dr. Chen will use the findings to develop a safety leadership program that enables future leaders to integrate safety culture into the building process. The program emphasizes an assessment of one's strengths and weaknesses, the development of self-improvement goals, and the practice of key leadership skills. The goal is to develop future leaders who motivate workers to follow safe work practices. The project will also develop and identify existing strategies to overcome research-to-practice (R2P) barriers to implementing and disseminating the leadership training program.

Participatory Ergonomics

Lead Researcher: Laura Welch, MD, CPWR

What are the most effective ways to curb the musculoskeletal disorders (MSDs) that plague the construction industry? Dr. Welch and her team are tackling this issue from all angles:

A masonry worker handling an average of 200 concrete masonry unit (CMU) blocks per day lifts the weight of two and one-half fully loaded Boeing 747-100s each year.

In the new grant cycle, Dr. Welch's team will work with three trades and 10 employers to study ergonomics interventions and measure their effect on workplace exposures, symptoms, productivity, and return on investment.

- The team is analyzing health insurance claims and workers' compensation data to determine the prevalence and incidence of MSDs among construction workers.
- Working with three trades, the team will measure workers' physical exposures in tasks that pose the highest physical risks. This information will be used to design methods for reducing the risks.
- Working with about 10 employers, representing small, medium, and large contractors, the researchers will deliver ergonomics training, help implement changes in equipment, work practices, or other interventions and measure the effectiveness of these various solutions.
- The team will measure the effect of the ergonomics interventions on work exposures, symptoms, productivity, and return on investment (ROI).

The project aims to show that investing in ergonomics interventions not only protects workers but also saves employers money, due to factors such as increased productivity and reduced injury claims. The team also seeks to identify the barriers to adoption of ergonomic solutions.

Performance Metrics

Lead Researcher: Janie Gittleman, PhD, MRP, CPWR

Performance metrics can take the guesswork out of workplace health and safety programs, as well as making a business case for such programs. Unfortunately, over the past decade there has been little progress in developing a system for measuring health and safety performance in the construction industry. While obtaining reliable performance metrics is a challenge for any industry, this is especially true for the construction industry, which consists of mostly small employers with widely disparate approaches to managing health and safety risks.

Dr. Gittleman's team aims to identify measures that are important and practical for small, medium and large contractors to collect over time. The data can be used to benchmark improvements in preventing and reducing injuries and illnesses.

The team will also develop criteria for evaluating the feasibility and practicality of using a metrics rating tool. Insurance

Dr. Gittleman will develop a system to measure safety and health performance on jobsites.

companies may be able to use these data to evaluate construction firms' experiences with workers' compensation. Regulatory agencies such as the OSHA consultation program are also interested in using the study results to track safety and health programs at the state and company level.

Residential Fall Protection

Lead Researcher: Bradley Evanoff, MD, MPH, Washington University, St. Louis

Falls from heights remain a leading cause of injury and death among construction workers, despite efforts by everyone affected. Many factors contribute to this chronic safety concern, including ineffective training, worker behavior, employer practices and safety culture, and lack of fall prevention and fall arrest equipment.

Dr. Evanoff's team aims to curb falls among residential carpenters through a supervisor-based safety training and mentorship program, along with an emphasis on the regular use of fall prevention devices. The team will conduct four main research activities:

- Measure long-term changes in fall protection knowledge, attitudes, and behaviors resulting from a school-based educational intervention in apprentice carpenters.
- Evaluate on-the-job fall protection safety training received by apprentice and journeyman carpenters, including both formal instruction (safety talks) and informal instruction (mentoring and direct feedback from foremen and senior carpenters).
- Implement and measure the effects of a supervisory-based safety intervention.
- Explore the benefits and barriers to using commercially available fall prevention equipment in residential construction, and promote the use of under-utilized, effective fall prevention technology.

This project builds on the relationships from previous research with the St. Louis Carpenters' Joint Apprenticeship Program, the Carpenters' District Council of Greater St. Louis and Vicinity, and residential contracting companies in the St. Louis region. St. Louis represents the nation's largest unionized residential carpenter workforce in a single geographic area.

Dr. Evanoff's team aims to curb falls among residential carpenters through supervisor-based training, mentoring, and changing attitudes toward safety and PPE.

Safety and Health Disparities

Lead Researcher: Xiuwen (Sue) Dong, DrPH, CPWR

The Data Center is tackling the root causes of safety and health disparities that are emerging among construction workers. The project will focus on Hispanic construction workers who, as a group, experience higher rates of fatalities than other construction workers. New immigrants and those employed in low-skill and high-risk occupations will be singled out for study. The Data Center will examine, for the first time, how discrimination, health behaviors, and work organization factors may affect trends in safety and

health disparities. Several nationally representative data sources are being utilized for the data analysis, including the Survey of Income and Program Participation (SIPP), the Collaborative Psychiatric Epidemiology Surveys (CPES), and a set of the National Surveys of Latinos (NSL). The findings from this study will be used to develop measures targeted at improving the health and safety of high-risk subpopulations within the construction industry.

Safety and Health Tracking Plan

Lead Researcher: Xiuwen (Sue) Dong, DrPH, CPWR

This project will track overall construction safety and health trends. The goal is to provide the basis for interventions in order to protect construction workers from serious workplace injuries and illnesses. To meet this challenge, the Data Center will monitor patterns of fatal and nonfatal injuries and illnesses in the construction industry. The Data Center will also characterize the changing construction workforce and identify emerging safety and health issues.

The Data Center will examine, for the first time, how discrimination, health behaviors, and work organization factors may affect trends in safety and health disparities.

The Data Center gathers detailed data on construction employment, economics, and safety and health using an array of large national data sets as well as databases developed by CPWR. This data collection effort will culminate in the fifth edition of *The Construction Chart Book: The U.S. Construction Industry and its Workers*. This edition, like previous editions, will present the most comprehensive data available on all aspects of the U.S. construction industry: economic, demographic, employment/income, education/training, and safety and health topics.

In addition to data collection and analysis, the Data Center provides statistical support to all construction stakeholders, including construction contractors, owners, workers, labor unions, trade associations, government agencies, and safety and health professionals, both here and abroad.

Safety Culture/Safety Incentives

Lead Researcher: Jack Dennerlein, PhD, Harvard University

Do positive rewards for safe work enhance safety programs? To answer this question, Dr. Dennerlein is partnering with the Harvard University Construction Services Group to undertake the following research:

- Developing a progressive incentive program that rewards workers, foremen, site supervisors and project managers for achieving a certain level of performance on safe work conditions, as measured with a safety inspection tool and performance monitoring (leading indicators of safety).
- Pilot-testing the incentive program on two small worksites at Harvard University and refining the program based on the results of the pilot.
- Completing a randomized control-intervention study on eight large construction projects. The newly developed incentive program, based on leading indicators of safety, will be randomly assigned to four of these sites. A conventional no-injury reporting incentive program (using lagging indicators) will serve as the control at the four other sites.

Silica and Noise Controls

Lead Researcher: Susan Woskie, PhD, University of Massachusetts, Lowell

Silica dust and noise continue to pose serious risks to construction workers, despite the availability of proven controls. Dr. Woskie and her team are partnering with demolition and concrete contractors, unions, and tool manufacturers to identify and overcome obstacles to using research-validated controls for these hazards.

The focus for controlling dust and silica exposures will be on implementing local exhaust ventilation and water suppression for powered hand tools and demolition equipment. Efforts to reduce the noise exposures generated by these tools will focus on two efforts: 1) encouraging employers to implement "Buy-Quiet" programs, which emphasize the availability of low-noise equipment, and 2) establishing Noise Perimeter Zones, clearly marked areas alerting workers to the need for hearing protection.

Sustainable Construction

Lead Researcher: John Gambatese, PhD, Oregon State University

Environmentally friendly, or "sustainable," buildings should have a better construction safety record than ordinary buildings, since sustainable concepts start with the health and welfare of humans. That's the premise of Dr. Gambatese's research. His previous work stressed the need to reduce construction safety and health hazards during the design and engineering phase. Now he is working on a tool modeled on the LEED system for rating a building's "green" quotient. His system would rate building projects based on their inclusion of safety and health elements throughout the design and construction phases. The project will also draw on CPWR-funded research conducted by Michael Toole, PhD, of Bucknell University. Dr. Toole focused on the owner's role in facilitating designing for safety.

The project aims to refine and validate the Sustainable Construction Safety and Health (SCSH) rating system, using data from historical and current construction projects. The researchers are collecting information from all parties involved in a project, tapping project owners in particular, because they are associated with all phases of building projects. The tool's development presents an opportunity to highlight those projects that stand out in their commitment to reduce worksite injuries. The researchers plan to create an online version of the rating system then spread the word about their study results and the rating system through webcasts and national conferences.
Pending NIOSH approval.

Vulnerable Worker Training and Safety Liaisons

Lead Researcher: Michele Ochsner, PhD, Rutgers University

Laborers in residential construction are vulnerable to injuries and illnesses due to their inexperience and lack of health and safety training. Through the efforts of the Rutgers team, laborers will be able to turn to "safety liaisons" for help on safe work practices. The project will recruit and train a group of union (LIUNA Local 55) and non-union (New Labor) construction laborers as peer safety leaders or safety liaisons. They will learn how to conduct informal safety audits and communicate with supervisors and employers about hazardous conditions. This training program will be conducted in Spanish and English, and safety liaisons will be supported in this role by New Labor and Local 55 staff.

Using English and Spanish language curriculum modules developed in the team's previous project, safety liaisons will also learn how to co-facilitate an OSHA 10-hour safety and health training program for their co-workers with an OSHA certified trainer. The research team will look at whether safety liaisons improve knowledge, work practices, and safety climate at residential construction worksites.

The project is a collaborative effort among Rutgers OTEC, New Labor, a worker center in New Jersey, and LIUNA-NJ Local 55, a new union local organizing residential construction in New Jersey. The setting for this project is the densely populated Newark area, where LIUNA-NJ Local 55 is opening new offices.

At-risk day laborers could see their peers trained as "safety liaisons" to provide information and advice on working safely in Dr. Ochsner's study.

Worker Health Across the Lifespan

Lead Researcher: Xiuwen (Sue) Dong, DrPH, CPWR

The CPWR Data Center is undertaking a comprehensive new study exploring the health of construction workers across their lifespan. The aim of this project is to identify ways to improve working-life expectancy by preventing chronic diseases and disabilities earlier in life.

This study will tap data from two large national longitudinal surveys: the 1979 cohort of the National Longitudinal Survey of Youth (NLSY79), which spans the years from teens to middle-age, and the Health and Retirement Study (HRS), which covers workers' lives near and after retirement. Both of the surveys collect detailed information on work history, demographics, socioeconomic status, and health (including work-related injuries) of the general population. The HRS also includes a special module for "Occupational Injuries," which collects information on OSHA inspections at job sites and certain workplace exposures. The Data Center will examine associations between occupational exposures and health outcomes, and detect work-related injuries and illnesses in self-employed workers, retired workers, and other workers who are excluded or underrepresented in current Bureau of Labor Statistics (BLS) injury and illness reports and workers' compensation systems.

Key findings from this study will serve as a guide to developing measures to prevent and reduce chronic diseases and disabilities within the construction workforce. The findings will be used to promote a safety and health culture in the construction industry.

A longitudinal study will analyze injury and illness data plus demographics, work history, socioeconomic status and general health on workers from their teen years to middle age.

Training

Hazardous operations require a specialized response. CPWR's specialized training includes confined space entry, asbestos and lead abatement, and hazardous waste cleanup. For general safety and health training, CPWR trains the trainers who will then deliver basic OSHA 10-hour courses.

Providing OSHA 10- and 30-hour safety and health training to construction workers is not just good practice. More and more, such training is mandatory. Seven states and one municipality now have laws requiring OSHA 10-hour training for construction workers. CPWR delivers OSHA 500 courses to train instructors and enrich the workforce with qualified trainers to support the more than three million organized construction workers on U.S. jobsites.

This year CPWR saw brisk demand for its OSHA training programs. In 2009, more than 120,000 union members received CPWR-affiliated OSHA training. CPWR Master Trainers trained 1,376 outreach trainers who are authorized to deliver OSHA 10-and 30-hour courses as well as the OSHA 7600 disaster site worker course.

CPWR's environmental hazard training offered several dynamic "trainer enhancement" workshops. In one, Master Trainers explored the hazards of "green construction" and were introduced to a rating system, now in development, modeled after the LEED "green" rating system to rate safety and health worksite practices.

In addition, CPWR responded to several requests from training centers. The CPWR Training Department provided expertise in drafting a new trade-specific manual on lead hazards, then modified and updated the training curriculum, culminating in a train-the-trainer instruction for Master Trainers.

responding

delivering

CPWR training enables workers to identify hazards and request the proper personal protective equipment.

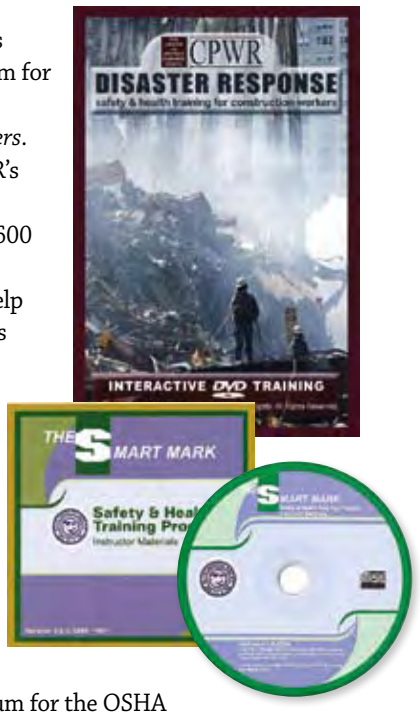
delivering *Safty & Health*

Preparing for Any Emergency

Thankfully, our nation did not experience a Hurricane Katrina-style disaster in 2009. But more and more construction workers are realizing that they are the "second responders" when weather-related or man-made incidents reduce buildings to rubble.

After September 11th, CPWR created a disaster response training program to prepare construction workers who want to put their skills to work in emergencies. The training covers health and safety topics for construction workers who are called in to help emergency responders in the aftermath of disasters such as tornadoes, hurricanes, or building collapses. Such workers perform a variety of response tasks, such as assessing building damage, clearing debris, and aiding in search and rescue. CPWR's disaster response training prepares construction workers to work safely in dangerous settings and to recognize the hazards posed during emergency response work. The program's DVD-based curriculum shows the life-and-death decisions workers face when deployed to a disaster. CPWR's program is used as a curriculum for the OSHA 7600: *Disaster Site Training for Construction Workers*. Every trainer who takes CPWR's OSHA 500 training is also authorized to deliver OSHA 7600 to construction workers.

CPWR has grant funds to help local union and building trades councils provide the disaster response course to their members. Chris Trahan, CPWR's director of OSHA and disaster response training, coordinates delivery of the program.

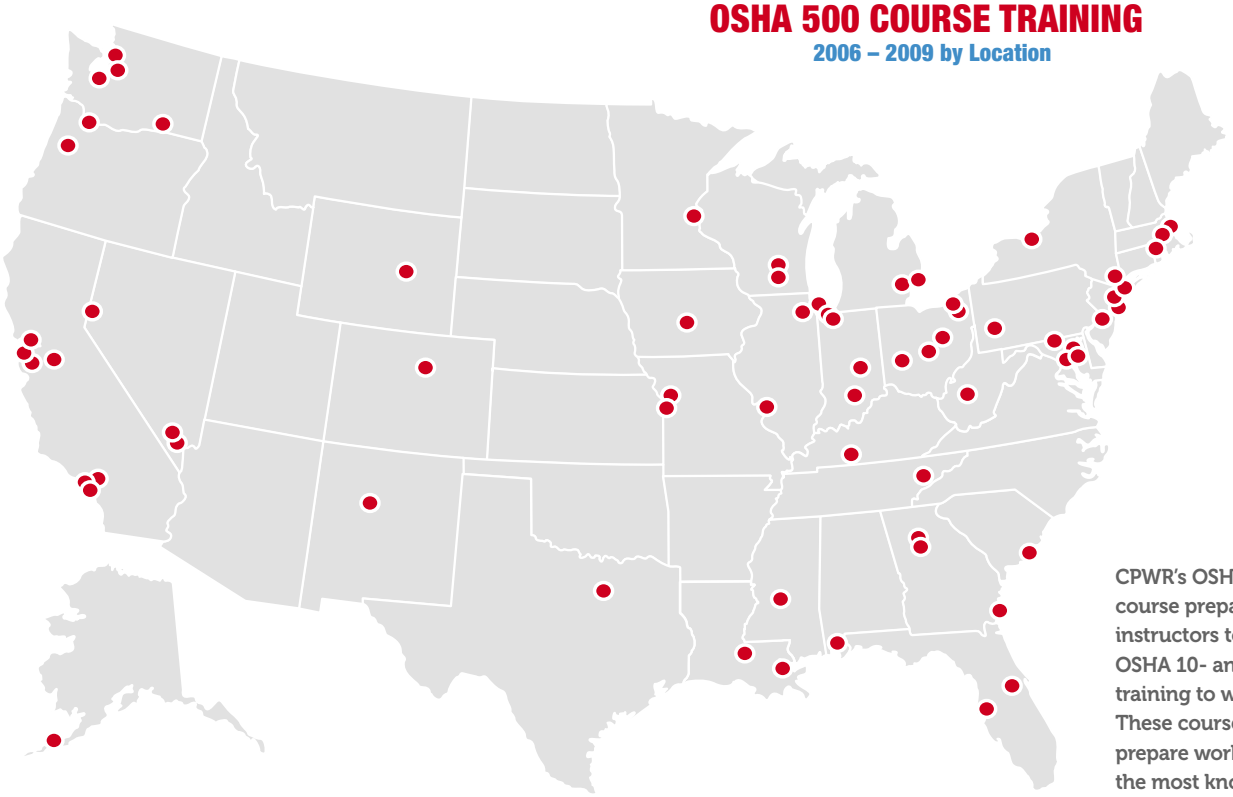


Smart Mark III

Demand is brisk for Smart Mark III, the training curriculum for the OSHA 10- and 30-hour programs offered by the Building and Construction Trades Department (BCTD) to building trades unions. And since 30 percent of all construction workers are

OSHA 500 COURSE TRAINING

2006 – 2009 by Location



CPWR's OSHA 500 course prepares instructors to present OSHA 10- and 30-hour training to workers. These courses help prepare workers to be the most knowledgeable and safest workers available to the construction industry.

CPWR OSHA Training

Conducted 8/2008-7/2009

89
OSHA 500 Train-the-Trainer Courses

REACHED
1,376
TRAINERS

6,349
OSHA 10-hr Courses

REACHED
97,346
WORKERS

1,451
OSHA 30-hr Courses

REACHED
21,431
WORKERS

120,153

TOTAL UNION MEMBERS TRAINED

nationally in CPWR-affiliated OSHA programs in the last year

Hispanic, Smart Mark curriculum is also available in Spanish.

In 2008, new modules on health and safety topics, including silica and motor vehicle safety, were added to the curriculum. Union instructors now have 19 ready-made modules to use in their OSHA outreach training. Since the program was expanded, nearly 1,000 copies of the Smart Mark III CD have been distributed by the BCTD.

The widespread availability of the highly regarded Smart Mark program coincides with a rise in laws mandating OSHA 10-hour training in construction. Currently, seven states (Massachusetts, New Hampshire, Connecticut, Rhode Island, New York, Missouri, and Nevada) and one municipality (New York City) have laws on the books requiring OSHA 10-hour certification for construction workers on certain projects.

Since 1998, more than 500,000 workers have completed Smart Mark training. Union trainers who are interested in using Smart Mark should have their international union's training department contact the BCTD for ordering information.

Fall protection is demonstrated in a CPWR OSHA 500 class in Portland, Ore. These train-the-trainer classes cover a wide variety of teaching techniques and all relevant aspects of the OSHA Construction Standards found in 29 CFR 1926, the federal code. Graduates are authorized to teach the OSHA 10- and 30-hour programs as well as the Disaster Response Worker class.

responding
To Environmental Hazards

Environmental Hazard Training

CPWR works in cooperation with international and national building trades unions to provide environmental and safety and health training to construction workers who do hazardous waste cleanup, as well as lead or asbestos abatement, permit-required confined space entry, or disaster cleanup, and to those who may be exposed to chemical or biological hazards on the job. This training is funded through awards from the National Institute of Environmental Health and Safety (NIEHS).

Trainer Enhancements

In order to continue developing health and safety instructors capable of delivering the environmental curriculum and training, CPWR conducts various Train-the-Trainer sessions and an annual Trainer Enhancement to enable instructors to recertify their hazardous waste, confined space, lead, and/or asbestos certificates.

A total of 79 health and safety instructors representing various trades attended the 2008 CPWR Trainer Enhancement held Oct.13-16 in Silver Spring, Md. In addition to the core sessions, the CPWR Training Department offered participatory and hands-on workshops on air monitoring, quantitative respirator fit-testing, supplied-air respirators, DVD training resources, and CPWR's new Mold Awareness Curriculum. Dr. David Michaels, who was confirmed as Assistant Secretary of Labor for the Occupational Safety and Health Administration (OSHA) in November 2009, addressed all participants during the opening session. A former research professor and chair of George Washington University's Environmental and Occupational Health Department, Michaels drew from his 2008 book, *Doubt Is Their Product*, which gave case studies of biased "science" to mislead the public and delay passage of new regulatory and compliance measures.

Dr. David Michaels, now Assistant Secretary of Labor for OSHA, spoke to instructors at CPWR's 2008 Trainer Enhancement.

The 2009 Trainer Enhancement held Sept. 27-30, in Portland, Ore., was attended by 81 instructors, business managers, and training directors representing various trades. In addition to trainer refresher workshops, CPWR took the opportunity to focus on worker health and safety as it pertains to "green" construction. Workshops included presentations by the U.S. Green Building Council, Cascadia Chapter, on its "LEED" rating system for new construction and by Dr. Michael Wilson from UC-Berkeley on "green" chemistry. Nancy Lessin spoke to the trainers about the union approach to health and safety, an alternative to behavior-based safety systems popular with many contractors. Oregon State PhD graduate Sathy Rajendran described his doctoral thesis linking worker health and safety to green construction and his tool to measure safety commitment on green construction jobs: the Sustainable Construction Safety & Health Rating System.

CPWR also conducted a Confined Space Train-the-Trainer April 20-24, 2009, in Portland, Ore. Thirty participants from various trades representing the insulators/asbestos workers, plumbers and pipefitters, sheet metal workers, carpenters, ironworkers, electrical workers, painters, boilermakers, and plasterers/cement masons attended. This component is especially important for CPWR's labor partners due to the broad exposure of their members to confined space hazards, not only in hazardous waste jobs, but throughout the construction industry.

Mike Murphy (foreground), Master Instructor for the IBEW's National Joint Apprenticeship Training Committee, and Charles Byerly, a health and safety trainer with the Plumbers and Pipefitters union in Paducah, Ky., sample a simulated confined space using a three-gas monitor, or "sniffer."

Responding to Requests

The Ironworkers International Union asked CPWR to help them revamp their lead awareness training. In response, CPWR crafted a new manual that incorporates many ironworker-specific tasks such as welding and torch-cutting of lead-contaminated steel. CPWR Master Trainer Gene Daniels modified and updated the curriculum covering health effects, exposure, ventilation, personal protective equipment (PPE), decontamination and other safety issues of concern to construction workers who are not involved in abatement, but who may be exposed to lead hazards in their normal work operations. This curriculum was used in a three-day pilot training Daniels delivered to nine Ironworker Master Instructors at their Benicia, Calif., training facility in February 2009.

CPWR Master Trainer George Newman (second from left) models hands-on training for the use of a self-contained breathing apparatus (SCBA) for health and safety instructors at the Bricklayers' International Masonry Institute in Bowie, Md. CPWR conducted this hazardous waste Train-the-Trainer session especially for this group.

CPWR also responded to a request from the Bricklayers union. The union needed to provide contractors in New York City and upstate New York with hazardous waste-trained bricklayers so contractors could bid on work removing PCB-contaminated caulk from public schools undergoing remodeling and renovation. CPWR provided three 40-Hour Hazardous Waste Worker courses for 63 Bricklayers members from New York and Connecticut. CPWR also went one step further by conducting a Hazardous Waste Train-the-Trainer course in Bowie, Md., March 16-20, 2009, for the Bricklayers' International Masonry Institute. Twenty Bricklayer journeymen and instructors attended this training and are prepared to deliver peer-led hazardous waste training for fellow members involved with the removal of PCB-contaminated caulk.

Minority Worker Training

Minority workers receive job skills and safety and health training through federal grants awarded to CPWR. Working in cooperation with a stable network of building trades unions and community-based organizations, this program prepares workers for employment in hazardous waste work at designated sites around the country – many in areas where these workers already live.

The goal of CPWR's Minority Worker Training (MWT) program is to train, certify, and secure jobs for economically disadvantaged ethnic minorities living in the communities near U.S. Environmental Protection Agency's Superfund National Priority's List sites and Brownfields sites. The training program includes adult literacy and environmental worker training, education, and certification, plus Building Trades-certified construction training. Pre-apprenticeship and life skills training for economically disadvantaged workers provide opportunities for long-term and well-paid employment serving minorities, communities, and the construction industry. Minority Worker Training Programs are currently underway in East Palo Alto, Calif., New Orleans, Los Angeles, and St. Paul, Minn.

In 2009, the Department of Energy cut all funding to their Brownfields Minority Worker Training. While CPWR was unhappy to lose this program aiding our nation's underserved workforce, a separate and larger EPA-funded program supporting many other trainees continued without interruption. Since 2000, the Minority Worker Training program trained 1,853 students, graduated 1,785 and placed 1,332.

Recent Graduate

Jocelyn Bowden, a single mother with three children, was placed with Tri Construction Company as a carpenter after graduating the program. Bowden is making $22.50 an hour, a major step up from her previous job. She faced the challenge of purchasing a vehicle to get to jobsites, as do many students in the program. The St. Paul MWT program partnered with the community-based program, Community Action, which provides car loans for used cars. Bowden was approved for an interest-free loan to obtain a car with a monthly payment of $42. If Bowden keeps her job for six months, the remainder of the loan will be forgiven.

Service

An average of four construction workers are killed every day on U.S. construction sites. More than 600,000 building trades workers who served our nation's nuclear weapons programs are now at risk of developing cancer and other life-threatening ailments from worksite exposure to hazards. What is being done to help workers?

For construction workers who were on Department of Energy nuclear sites, BTMed can be a lifeline. The Building Trades National Medical Screening Program (BTMed) helps identify work-related health problems through free medical screenings. CPWR has been coordinating this program since its inception in 1996. In addition, CPWR aids workers in verifying employment to gain access to compensation. BTMed now has outreach offices in 23 locations nationwide.

For the 11 million construction workers on U.S. worksites, CPWR takes research findings from its applied research program and packages the information for workers, trainers, safety directors, and contractors. DVDs, Hazard Alert cards, technical reports, and more have been produced to provide clear, factual information for anyone in the construction industry. CPWR's electronic Library of Construction Occupational Safety and Health, eLCOSH, has become a world-renown repository of vital industry information. It has been joined by Construction Solutions, an online database of hazard controls, in the 2004-2009 grant cycle.

As researchers discover new ways to protect workers' health and safety, CPWR seeks to see their findings become part of industry practices. All of CPWR's products are either free or low cost.

serving

informing

The construction industry has access to high-quality safety and health information through CPWR print and electronic media.

Serving *Our Communities*

Building Trades National Medical Screening Program (BTMed)

Hundreds of thousands of construction workers unwittingly put themselves at risk as they worked on Department of Energy (DOE) nuclear sites involved in nuclear weapons production. While safety and health precautions are greatly improved from the early days during and after World War II, today's workers can still encounter hazardous materials in dust and residue. Workers were (and are) exposed to hazards such as radiation, asbestos, beryllium, cadmium, chromium, lead, silica, and solvents, which can cause cancer and other serious, even fatal, health problems

But those who worked on DOE nuclear sites are eligible to receive free medical screenings through the Building Trades National Medical Screening Program (BTMed). The screening program helps identify workers' job-related health problems that may have gone untreated or undiagnosed in the years since the hazardous exposures occurred. BTMed was the first program to document that construction workers in the nuclear weapons programs are at risk for beryllium disease.

CPWR's Trish Quinn has been at the helm of BTMed since the Department of Energy began funding the program in 1996. Since that time, approximately 20,000 workers have received screenings. In addition to serving former workers, the program is also helping to make today's DOE workplaces safer, by documenting the need for stringent safety and health protections during construction work such as repair, renovation, and demolition. BTMed is by far the largest medical study of older construction workers ever undertaken. This study is producing a rapidly growing record of new knowledge on a wide range of issues, including improvements in worker protection and in medical care for patients with chronic diseases.

How the Free Screening Program Works

Workers start with a work-history interview. They are offered a free medical screening exam and specialized tests if their work history indicates possible exposure to hazardous substances. The worker receives a written summary of all medical results and a nurse is available to explain the report.

A network of 23 BTMed outreach offices near DOE sites works with local unions and the community to promote the free screening program. The outreach office in Oak Ridge, Tenn., was featured on a local television news program in November 2009 (see p. 29). CPWR also supports a Web site, www.btmed.org, which provides information to workers and their families.

In 2009 …

- *2,993 workers were screened.*
- *Participant satisfaction continued its steady annual growth, rising from 92 percent in 2006 to 99 percent in 2009.*
- *Articles featuring the BTMed program appeared in four union publications: magazines of the IBEW, Painters, Cement Masons, and the Plumbers and Pipefitters training newsletter.*

Key Medical Findings of the Screening Program

- *X-ray evidence of lung disease in 25 percent of screened workers.*
- *Audiometry test evidence of hearing loss in 70 percent.*
- *Blood test results showing beryllium disease in 2 percent.*

Dr. Laura Welch

Informing Physicians

Laura Welch, MD, medical advisor to the BTMed program, addressed an audience of medical students, internal medicine residents, and faculty members when she delivered the 10th annual James P. Keogh Memorial Lecture at the University of Maryland School of Medicine in October 2009. She presented the latest findings on chronic beryllium disease (CBD), which can be treated but not cured and is sometimes fatal. CBD is a concern among construction workers currently or formerly employed at DOE nuclear sites that used beryllium to manufacture nuclear weapons. Maintenance, demolition or renovations may disturb residual beryllium dust generated from long-ago operations.

As CPWR's medical director and a board-certified physician in occupational medicine, Dr. Welch is also keenly aware that all construction workers are exposed to numerous health hazards that can manifest as serious, even fatal, diseases later in life. Physicians without an occupational medicine background may misdiagnose a health problem or never connect the disease, such as lung cancer, to the patient's work. She took the opportunity to address construction-specific health problems during the "grand rounds," which the Keogh lecturer makes during residents' morning report at the university's medical center.

Employment Verification

Congress created a program in 2000 to compensate workers sickened by exposure to hazardous materials while working on DOE nuclear sites. In order to obtain compensation, workers must prove their medical problems are related to their DOE site work. But DOE did not keep employment records on subcontractors, so proving their eligibility for compensation is difficult (see box for a personal account about this issue). At DOL's request, CPWR works with local building trades unions and subcontractors to obtain union and union-employer trust funds records, such as dispatch cards or pension contribution receipts, to help with employer verification. CPWR has assisted with more than 13,670 verification requests since 2003.

Local TV "News at 5" Features BTMed's Oak Ridge Office

In November 2009, a flood of calls came into BTMed's Oak Ridge, Tenn., office after a television station ran a 3½-minute segment about the local screening program. The segment aired Nov. 16, during the 5 p.m. news on WATE, Channel 6, in Knoxville. The piece showed BTMed's staff working to get free medical exams and compensation assistance for ill construction workers who were employed at local DOE nuclear sites. Of the workers screened at BTMed's Oak Ridge office, 449 have been diagnosed with various forms of cancer.

As the show noted, construction workers have unique difficulties when it comes to proving eligibility for compensation for illnesses following their hazardous exposures on DOE nuclear sites. DOE treated subcontractors as "temporary workers" and was not required to keep any employment records on them. (See "Employment Verification" above.)

To demonstrate the terrible plight faced by ill construction workers who lack proper records, the show interviewed a construction worker with colon cancer who had worked for 15 years on six different DOE sites. Although his medical claim was originally approved, it was later denied because he didn't have records proving that he worked enough days at a single site to be included among employee groups qualifying for compensation, based on exposures and length of employment. Many construction workers who were employed on DOE nuclear sites face similar circumstances.

After the show posted the BTMed's phone number, more than 50 people called to learn more about the screening program. The segment can be viewed online by following this link on BTMed's Web site:

https://www.btmed.org/links.cfm

BTMed staff created new displays in 2009, like the one above, to promote the program at public and union events.

informing *Our Industry*

Renovating eLCOSH – *Ourelectronic Library*

CPWR's electronic Library of Construction Occupational Safety and Health, www.elcosh.org, has grown to include more than 1,000 documents. This premier online resource averages about 50,000 unique visitors every month, as new research findings, training tools, recent magazine articles, videos, and more are posted continually.

However, the online world and its users have changed considerably since eLCOSH was launched in August of 2000, and an upgrade of the site is now in the works. The changes started in October 2009, when all pages on eLCOSH were given icons to make emailing, printing, and posting to social networking sites like LinkedIn, Facebook and Twitter easily available. Both eLCOSH and CPWR have pages on Facebook.

Starting in 2010, the site will see a major overhaul, as CPWR staff begin working with safety and health professionals, researchers, trainers, contractors and government representatives to re-imagine and restructure the site. Site usability testing will provide guidance on revising layouts, menu items, and navigation. Web development firm Conceptual Arts will redesign the site and add features, such as a notification service to users when documents on select topics are posted. New content and new topics such as r2p best practices, "green" construction and emerging hazards will be added.

eLCOSH Images Launched

Looking for good quality photos depicting construction safety and health themes? A collection of these kinds of photos is available free of charge at www.eLCOSHImages.org, launched December 2009. All photos are accompanied by descriptions of the hazard, possible control, and the trades involved, as well as a citation as "good practice" or "bad practice." Most photos are available as high resolution images for printing and low resolution for presentations and screens. In fact, a number of photos used in this publication came from eLCOSH Images.

New photos are continually added to the site. As parent site eLCOSH is restructured, eLCOSH Images will be upgraded to enable users to share their construction photos for training and demonstration purposes.

Expanding Solutions

construction solutions
work hazards, and options for making work safer

Construction Solutions, CPWR's online database of jobsite hazards with solutions for reducing, controlling or eliminating the hazards, saw expansion in all areas. The online resource provides a user-friendly format that helps take the guesswork out of construction health and safety. As of September 2009, the database contained 451 task-hazard records, with 150 in review, and 59 solution records, with 30 in development and review. The most popular solutions were Lightweight Concrete Block with 6,133 total views and Rebar Tying Tools with 2,736 views, followed closely by Ergonomic Hand Tools with 2,437 views.

In 2009, researchers and safety professionals wrote controls for task hazards that touched every trade. In 2010, the site will continue to add tasks, identify hazards and offer solutions.

Using Google Adword

Google Adword is a keyword-based advertising system. CPWR was awarded a Google Grant, which enables nonprofits to use the Google Adword advertising at almost no cost.

The Google Adword program has been a resounding success. More than 50,000 visitors have entered eLCOSH through Google Adwords in just six months, and close to 10,000 visitors entered Construction Solutions. In April 2009, the eLCOSH ad appeared 527,403 times and yielded 11,588 visitors. The ads, which cost a few hundred dollars for six months, were worth nearly $45,000 in paid advertising for the two sites.

Linking eLCOSH & Solutions

Construction Solutions and eLCOSH evolved at different times with independent identities and were never connected. In the new grant cycle, Conceptual Arts will develop programming to automatically establish links between eLCOSH and Construction Solutions pages on similar topics. Cross referencing the two sites will introduce new users to both sites and will provide additional information for searches.

Share Your COSH Knowledge!

All of the solutions in the Construction Solutions database have been authored by one professional, and peer-reviewed by two others. If you would like to help grow Construction Solutions, there are several ways you can contribute:

1. **Suggest solutions –** We may ask you to examine hazard analyses appropriate for your background so that you can suggest solutions to add to the database.
2. **Review a solution –** When a solution appropriate to your background has been authored, we may contact you about reviewing the initial draft.

Go to www.cpwrConstructionSolutions.org and click on "Volunteer" to share your knowledge and help improve worksite safety for workers at home and abroad.

An ENR Cover Story

After an *Engineering News Record* (ENR) editorial on "portable safety report cards" sparked an unprecedented number of comments on its Web site, ENR decided to run a point-counterpoint cover story on the controversial proposal. Whom did the magazine choose to provide expert analysis for the counterpoint? CPWR.


Unrealistic Plan Poses Many Problems And
Won't Do the Job
ENR.com

Portable safety records would track workers' injuries and follow them from job to job, and would be maintained by OSHA. Pete Stafford, CPWR's executive director, found the idea misguided and impractical. Having OSHA maintain injury records for more than 11 million people was "not realistic." Also, by "marking" workers who are injured, the approach puts the responsibility for safety solely on the shoulders of workers, who have little control over worksite conditions. "Workers don't design jobs or draw up schedules," Stafford wrote. "They can arrive at a site without engineering controls, PPE, a safety plan or manager. They can be given poorly maintained equipment that fails."

ENR's August story generated comments online until mid-October of 2009. Read the articles and form your own opinions at ENR's site, which gets more than one million hits a month.

http://enr.construction.com/opinions/viewpoint/2009/0812-PortableSafetyRecord.asp

McCann Receives r2p Award

CPWR's Michael McCann, PhD, was on a team of researchers who received the Bullard-Sherwood Research-to-Practice (r2p) Award for their research on aerial lifts. The study, headed by Dr. Christopher Pan of the NIOSH Division of Safety Research, will provide industry with a refined test protocol to be used for aerial lift drop testing. Six major fall protection system manufacturers collaborated with aerial lift manufacturer Sky Jack and the ANSI Z359 fall protection system standard committee on the project.

Selected Journal Articles and Reports

CPWR researchers published 115 articles in peer-reviewed journals from 2004-2009.

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Sokas RK, Nickels L, Rankin, K, Gittleman JL, Trahan C [2007]. Trainer evaluation of a union-based 10-hour safety and health hazard awareness program for U.S. Construction Workers. Int J Occup Environ Health, 13:56-63.

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Weinstein M, Hecker S, Hess J, Kincl L [2007]. There is nothing so practical as a good theory: A roadmap to diffuse ergonomic innovations in the construction industry. Int J Occup Environ Health, 13:46-55.

See complete listing at http://www.cpwr.com/rp-journalarticles.html

CPWR Products

Between 2004 and 2009, CPWR research, training and outreach programs developed a wide range of products.

- **1** Book
- **1** Data brief
- **2** Book chapters
- **2** Demonstration videos
- **3** Podcasts
- **3** Social media sites
- **4** DVDs
- **4** New tools/equipment to improve safety and health of workers
- **5** Seminars
- **6** Web sites/wiki site
- **11** Training programs
- **14** Brochures or fliers
- **22** Guidebooks, manuals or participant handouts
- **22** White papers/technical reports
- **62** Articles in industry/union/trade publications authored by CPWR staff or researchers
- **115** Articles in peer-reviewed journals authored by CPWR-funded researchers
- **407** Presentations

CPWR Responded to ...

- **100** calls a week from workers or family members to the BTMed program
- **460** calls a year made regarding CPWR's Environmental Hazard Training Program
- **750** information/statistical consultations requests received by the CPWR Data Center between 2004-2009
- **21,343** Hazard Alert cards distributed through requests, conferences, and mailings to trainees from January 1 through December 31, 2009

Two Training Programs to Improve Safety Culture

New Tools for Hard Hats is a training program for two audiences.

For Contractors: **Proactive Management** fosters safety communication at all levels and focuses on foremen as the leverage of change.

- Foremen training
- Superintendent strategies for supporting foremen
- Communications campaign of posters, paycheck stuffers, and effective toolbox talks

For Workers/Apprentices: **Safe Talk** is an interactive training program on sharing near misses, safety feedback, and anger management.

Peer-reviewed Journals

CPWR researchers published 115 articles in peer-reviewed journals from 2004-2009.

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U.S. Department of Labor

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