

injured, their claims can be more costly and their injuries may take longer to heal. Specifically, it is anticipated that as the work force ages, there will be substantial increases in back injuries, stress claims, and cumulative trauma disorders. Claims associated with these conditions will have a large adverse impact on the Workers Compensation System.

Employers can implement a number of preventative measures to address the health and safety concerns of the aging workforce. It may be necessary to manipulate the work environment to compensate for worker deficits in vision and hearing. Work stations may need to be redesigned to avoid increased ergonomic issues. Advantages to the employer will include fewer lost-time days and lower worker compensation costs. This paper addresses these issues and other factors employers will need to consider and preparations they will need to take over the next few years to prepare for the special needs of an aging workforce.

124. MANAGING OCCUPATIONAL EXPOSURE TO MERCURY VAPOR FROM MUSEUM COLLECTIONS. K. Makos, Smithsonian Institution, Washington, DC; G. Burroughs, NIOSH, Cincinnati, OH

During the past two centuries, millions of botanical specimens in museum and university study collections were treated with mercuric chloride as a prophylactic against mold and insect pests. Over time, mercuric chloride dissociates into elemental mercury vapor, accumulating in closed storage. Collections facilities typically have hundreds of cases, each posing a potential health hazard to staff and visiting scientists. Practical and affordable means for mercury vapor detection and mitigation were explored. A commercially available mercury indicator powder was mixed into a water slurry, applied to glass slides, and placed inside multiple cases. Ambient concentrations inside the cases were measured at time intervals with a direct measurement instrument and confirmed to correspond to varying degrees of indicator color changes (verified by Munsell color charts). The indicator slurry application provided a quick, inexpensive qualitative detection method for mercury vapor, even at extremely low levels (0.003-0.005 mg/M³). Next, the efficacy of case aeration as a prudent work practice was examined. A random direct measurement sampling of 184 collection cases was conducted within 6 inches of the front of the open case, at 15, 30, 45, and 60 second intervals per case. Comparison of the arithmetic means of each interval's sample set revealed their statistical distinction. In the presence of good general ventilation, a true and significant reduction of mercury vapor concentration (to less than 0.025 mg/M³) was achieved by sixty second case purging. Finally, a scavenger product in commercial development (paper sheets coated with a treated charcoal mixture) was tested in a random sample of collection cases. Preliminary results indicat-

ed that the product was effective in reducing accumulated mercury vapor concentrations, with the potential as an affordable and easily applied product.

125. THE POWER OF PARTNERING INDUSTRY WITH THE PUBLIC SAFETY COMMUNITY. P. Tranchell, Bristol-Myers Squibb Co., Syracuse, NY

In the early 1990's Onondaga County formed the Disaster Preparedness Committee, an informal committee to plan for and prepare for a unified disaster response during natural or man-made catastrophes. From the beginning, the committee planned based on when, not if disaster would strike. The committee was a voluntary group that represented all aspects of the public safety community.

In 1993, the committee offered an integrated incident command training program called "Public Safety Critical Incident Management." The program included lectures on each agency's response and practical tabletop scenarios using a HO scale city. The private safety community was invited to participate primarily to provide funding. After the first class, it was obvious that business and industry was an afterthought.

This began the process of integrating business and industry into the committee and the program. The private industry response session was rewritten and the scenarios were modified to include private safety input. The benefits have been positive and received positive feedback from the NYS Emergency Management Office, Federal Emergency Management Agency, Department of Justice and Department of Defense, to name a few.

Positive benefits include response to a severe ice storm in northern New York. This was the first incident where utility representatives were present in the Emergency Operation Centers (EOCs) to provide an integrated response. A Labor Day storm devastated the Syracuse area and resulted in widespread power outages. A private safety disaster manager became the commander of the EOC in Onondaga County. Industrial hygienists have become integrated into the teaching Emergency Response to Terrorism. Their expertise in chemical, biological, and radiation safety are invaluable in helping the public safety responders understand the risks and protective measures necessary. Industrial hygienists are also becoming resources to the County Hazardous Materials Response Team.

126. PROJECT EXCITE: ENVIRONMENTAL HEALTH SCIENCE EXPLORATIONS THROUGH CROSS-DISCIPLINARY AND INVESTIGATIVE TEAM EXPERIENCES. C. Keil, J. Haney, G. Silverman, A. Boros, Bowling Green State University, Bowling Green, OH

National research has shown that environmental health science (EHS) issues can be suc-

cessfully used as an integrating context for effective learning and improving student achievement. Project EXCITE (Environmental Health Science Explorations through Cross-disciplinary and Investigative Team Experiences) is a 5th through 9th grade education project being implemented in northwest Ohio funded through the National Institute of Environmental Health Science. The project enables interdisciplinary teacher teams to design and implement problem based learning (PBL) modules on EHS topics that are pertinent to the local community. University educators, scientists, and community EHS professionals provide professional development, guidance in unit development and assistance in material delivery in the classrooms. Using the PBL approach puts students in the role of active learners and problem solvers tackling inherently ill-structured EHS issues. Importantly, PBL includes implementation and action and thus is a stepping-stone and initiator of true service learning and community involvement. Participating students will take action by means of organizing events, providing service, sharing information, or other appropriate activities. The current cohort of six teacher teams has been through a summer training program introducing them to EHS and PBL and during fall 2001 are developing their modules to be implemented in their classrooms in the spring. Topics that are included in the modules are: indoor environmental quality in schools, planning and construction of electrical generation stations, disease clusters in communities, and the impacts of roadway development surrounding schools. Teacher beliefs on the efficacy of EHS as an integrating context are being tracked throughout the project. Student achievement is being assessed by various methods including standardized testing, performance portfolios, and performance on tools to measure critical thinking. A colloquium in spring 2002 will showcase the results of the student work and will be reported.

PF 118. Gas & Vapor Detection Papers 127-132

127. VALIDATION OF A REAL-TIME AMMONIA MONITOR. P. O'Shaughnessy, S. Wright, University of Iowa, Iowa City, IA; S. Hoke, U.S. Army CHPPM, Aberdeen Proving Ground, MD

To access the impact of commercial animal confinements on local ambient concentrations of ammonia, a direct-reading instrument capable of measuring in the parts-per-billion range is needed. Available instruments of this sort are primarily used as warning devices and measure to within 1 ppm with an accuracy of 1 ppm.

A novel, low-level, direct-reading ammonia monitor was constructed to satisfy this need. The test instrument uses a gas exchange device consisting of gas-permeable filaments through which an alkaline buffer solution is pumped.

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ABSTRACTS



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2002 Abstract Index by Session Topic

Platform Session Topic	Abstract No.
Aerosols	157-164
Agricultural Health and Safety	1-6
Air Sampling Instrument Performance	79-86
Bioaerosols	165-173
Biological Monitoring	56-66
Community Environmental Health and Safety Issues and Social Concerns	121-126
Computer Applications in Industrial Hygiene	270-280
Construction and Equipment	218-223
Contaminant Control	140-147
Current Topics in Noise and Hearing Loss	32-38
Dermal Exposures	174-184
Ergonomics Intervention	67-72
Exposure Assessment Strategies I	39-46
Exposure Assessment Strategies II	210-217
Gas & Vapor Detection	127-132
Health Care	112-120
Indoor Environmental Quality	242-250
Industrial Hygiene General Practice	251-262
International Occupational Hygiene	232-241
Investigating Community Air Quality	203-209
Ionizing and Nonionizing Radiation Risks: Measuring the Exposure	13-18
Laboratory Health and Safety	87-94
Lead I	103-111
Lead II	263-269

Platform Session Topic	Abstract No.
Management/Leadership	224-231
Occupational Epidemiology	25-31
Occupational Ergonomics: Training and Risk Assessment	7-12
Occupational Medicine/Occupational Epidemiology	148-156
Personal Protective Clothing and Equipment	133-139
Regulating the Right Hazards Rightly	19-24
Respiratory Protection	185-195
Risk Assessment in Industry and of Terrorism's Aftermath	196-202
Testing for Air Quality in the Garage	73-78
Toxicology and Toxicology Models (BPBK and QSAR)	47-53, 53,1-55
Ventilation	95-102

Poster Sessions	Abstract No.
Poster Session 501	327-356
Poster Session 502	357-384
Poster Session 503	385-413
Poster Session 504	414-442

Case Study Sessions	Abstract No.
Case Study 301	281-292
Case Study 302	293-303
Case Study 303	304-310
Case Study 304	311-314, 317-318
Case Study 305	319-326

PF 101 Agricultural Health and Safety

Papers 1-6

1. RELATIONSHIPS BETWEEN WORK EXPOSURE AND RESPIRATORY OUTCOMES IN POULTRY WORKERS.

S. Kirychuk, J. Dosman, P. Willson, L. Dwernychuk, University of Saskatchewan, Saskatoon, SK, Canada; J. Feddes, A. Senthilselvan, C. Ouellette, University of Alberta, Edmonton, AB, Canada

A pilot study was conducted on 74 poultry barn workers in Western Canada during the winters of 1998-2000. General respiratory health, current, chronic and work related respiratory symptoms; general work duties, and work-site factors were ascertained, pre-exposure, by questionnaire. Personal airborne exposure levels and changes in symptoms and lung function were measured across the work-shift for all workers. Workers were classified according to the type of poultry operation (floor based, n=53; cage based, n=13) in which they worked. There was no significant difference in daily hours spent in the barn between those who worked with caged poultry (5.41±2.35 hours) and those who worked with floor-based poultry (4.42±2.48 hours). Age of birds was 47.10±58.36 days for floor based versus 155.91±63.01 days for cage based facilities.

There were no significant differences in personal environmental measurements between cage-based and floor-based facilities (ammonia 13.22±13.70 ppm, 17.34±16.35 ppm; total dust 5.74±4.85mg/m³, 10.01 ±8.84 mg/m³; endotoxin 6046±6089 EU/m³, 5457±5934 EU/m³ respectively). There were no significant differences in across work-shift change in pulmonary function indices between workers from cage and floor-based operations. For the entire sample total dust dose (work hours/day x total dust) significantly correlated with across-shift change in FEV₁, whereas endotoxin dose and ammonia dose did not. Stocking density was significantly correlated with average ammonia (ppm, p=0.002) and ammonia dose (ppm x work hours/day; p=0.004) in floor based operations and with total dust (particles/ml, p=0.002) in cage based populations. Stocking density was also significantly correlated with chronic cough (p=0.003) and across work-shift cough (p=0.05) and chest tightness (p=0.06) for workers from floor based operations; and with phlegm when working (p=0.018) and chest tightness across the work-shift (p=0.004) for workers from cage based operations. Type of poultry production operation and therefore type of work exposures appear to significantly impact symptoms experienced by workers exposed to these atmospheres.

2. DUST GENERATION SYSTEM FOR AGRICULTURAL SOIL DUST. K. Lee, R. Domingo-Neumann, R. Southard, UC Davis, Davis, CA

Agricultural workers are prone to exposure to mixed dust of inorganic and organic compounds. Diverse working conditions and operations in agriculture make direct measurements of the mixed dust exposure difficult. This study was conducted to develop a new dust generation system to determine possible exposure potency indicators of soil samples. The dust generator consists of a blower, a rotating chamber and a settling chamber. The rotating chamber has inner baffles to provide sufficient agitation of the samples while the chamber is rotating. A blower provides air into the rotating chamber, and the suspended dust is moved to the settling chamber through a perforated pipe. A small fan inside the settling chamber helps maintain suspension of the dust. Various size fractions of dust are sampled on filters suspended in the chamber via outlet ports and attached pumps. Air pressure is released through a filter plate mounted on the wall of the settling chamber. Various operating conditions were evaluated: air intake from blower, speed of rotation, soil mass and sampling time. To evaluate the characteristics of dust from the system, we collected dust samples from agricultural fields while the soil was prepared for