

PERSONAL EXPOSURE TO TOTAL DUST, AMMONIA, AND ENDOTOXIN AMONG WORKERS IN A SWINE CONFINEMENT FACILITY. R. Malcolm, L. Conroy, T. Schoonover, S. Erdal, University of Illinois at Chicago, Chicago, IL.

A study was conducted to evaluate workers' exposure to total dust, ammonia, and endotoxin in a swine confinement facility located in central Illinois. This facility housed approximately 17,000 pigs. Personal samples of total dust, ammonia, and endotoxin were collected over a two-day period. Seven of eight workers were sampled on Day 1 and five of eight workers were sampled on Day 2. Five University of Illinois at Chicago (UIC) observers were sampled on both days. Two 37-mm cassette filters connected to a single pump using a Y connector were used to sample for total dust and endotoxin, respectively. Ammonia was collected using a passive sampler attached to the worker. Overall total dust concentrations ranged from 0.077–8.15 mg/m³ (mean = 2.88 mg/m³). The total dust concentrations for swine confinement workers ranged from 0.359–5.77 mg/m³ (mean = 3.31 mg/m³), whereas the total dust concentrations for UIC observers ranged from 0.077–8.15 mg/m³ (mean = 2.26 mg/m³). Ammonia concentrations ranged from 2.79–16.8 ppm (mean = 8.74 ppm) for all participants. Ammonia concentrations for swine confinement workers ranged from 5.60–16.8 ppm (mean = 9.24 ppm), whereas ammonia concentrations for UIC observers ranged from 5.82–10.3 ppm (mean = 8.16 ppm). Endotoxin concentrations ranged from 316–8435 EU/m³ (mean = 2425 EU/m³) for all participants. Endotoxin concentrations ranged from 316–8036 EU/m³ (mean = 2107 EU/m³) and from 323–8435 EU/m³ (mean = 2732 EU/m³) for swine confinement workers and UIC observers, respectively. The TLV for nuisance dust was not exceeded; however, this is not a valid comparison. Based on previous studies it has been shown that dust generated in a swine confinement facility is an organic dust not nuisance dust. The TLV of 25 ppm for ammonia was not exceeded; however, the highest concentration is greater than half the TLV. Based on previous studies the highest endotoxin concentration (8435 EU/m³) would not be considered a high concentration for workers in a swine confinement facility.

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THE EFFECTS OF ENVIRONMENTAL IMPROVEMENT ON THE BIOAEROSOL CONCENTRATIONS IN THE LAYER HOUSES.

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The bioaerosol concentrations in the layer houses would be as high as 10⁶ CFU/m³, where the environment control should be needed. In

order to evaluate the effect of the environmental improvement, the bioaerosol concentrations were measured before and after the improvement at two layer houses in central Taiwan, with 15,000 and 20,000 layers, respectively. For each sampling day, four sequential bioaerosol samples were collected by the AGI-30 all-glass impingers at the flow rates of 12.5 L/min, and tryptic soy agar (Scharlau) and malt extract agar (Difco) were selected to recover bacterial and fungal colonies, respectively. In the first layer house, the fungal concentrations before improvement were found to be 1.98×10⁴, 8.25×10⁴, and 4.99×10⁵ CFU/m³ for the three sampling days, respectively. After the improvement, the fungal concentrations were found to be 3.13×10², 1.43×10³, and 3.31×10³ CFU/m³, respectively. In the second layer house, the fungal concentrations before improvement were found to be 8.94×10³, 1.76×10⁵, and 13.4×10⁵ for the three sampling days, respectively. After the improvement, the fungal concentrations were found to be 1.31×10³, 8.57×10³, and 8.58×10³ CFU/m³, respectively. In the first layer house, the airborne bacterial concentrations before improvement were found to be 1.24×10⁵, 3.35×10⁵, and 7.54×10⁴ CFU/m³ for the three sampling days, respectively. After the improvement, the bacterial concentrations were found to be 3.78×10⁴, 4.91×10⁴, and 2.79×10⁴ CFU/m³, respectively. In the second layer house, the bacterial concentrations before improvement were found to be 2.42×10⁵, 5.90×10⁴, and 1.12×10⁵ CFU/m³ for the three sampling days, respectively. After the improvement, the bacterial concentrations were found to be 5.41×10⁴, 3.39×10⁴, and 2.46×10⁴ CFU/m³, respectively. The results demonstrated that the fungal and bacterial bioaerosol concentrations in the layer houses decreased after the environmental improvement.

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AN OVERVIEW OF CLOSED SYSTEM USE FOR PESTICIDES IN CALIFORNIA, 2001–2002.

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The California Department of Pesticide Regulation conducted a survey of sealed pesticide transfer devices (closed systems) in use between 2001 and 2002. The use of closed systems has been a regulatory requirement since the late 1970s. Since a standard design was not promulgated, there have been various attempts to fulfill the requirements found in the "Director's Criteria for Closed Systems." Closed systems allow for the sealed transfer of pesticides from their original container into mixing equipment, then into application equipment.

Three major systems were identified: suction extraction, container breach, and direct drop/gravity feed. Suction extraction depends on vacuum removal of container contents. Container breach utilizes slicing or spearing actions to puncture containers. Direct drop/gravity feed allows the container to be directly connected atop the mixing tank and use gravity to empty into the tank.

The closed systems were surveyed as to their compliance with the Director's criteria. The system users were also queried as to problems encountered. Most of the systems surveyed met the criteria. However, there was a general set of problems identified. These problems were: non-standardized container interfaces; problems with container rinsing; measuring difficulties; and system complexities.

The nonstandardized container interfaces and container rinsing problems are interrelated, since in both cases removal of either the concentrate or the pesticide-contaminated rinsate is by the same means. Fine measurement is likewise difficult, especially with container breach systems.

Complexity problems often arise from inadequately trained or untrained personnel (i.e., emergency responders). Under these conditions, the lack of posted instructions and unidentified control and flow systems could cause unsafe conditions. A standard opening interface requirement may resolve many of the problems. Better identification of hose contents, valve operation, and the posting of emergency shutdown procedures could address the problems of conduit and valve identification and emergency shutdown.

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OCCUPATIONAL EXPOSURES TO NOISE IN AGRICULTURAL SETTINGS.

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Agricultural workers are exposed to excessive noise levels on a routine basis. However, there are limited data in the scientific literature characterizing the occupational noise exposures to agricultural workers. This abstract discusses two health hazard evaluations conducted by the National Institute for Occupational Safety and Health (NIOSH) in three agricultural settings. Personal dosimetry was collected on employees at a swine confinement, a potato processing, and an alfalfa manufacturing facility. Area noise measurements were also taken throughout these three facilities.

At the swine confinement facility, all seven dosimeter samples were below the OSHA permissible exposure limit. However, the potential for high noise exposures is evident in the noise dose of specific short-term activities such as power washing of barns and during snout snaring and ear clipping. At the potato processing and alfalfa manufacturing operations, five of 20 employees who were monitored attained or exceeded the NIOSH REL. Two of them also exceeded the OSHA AL. The highest noise exposure at the potato processing plant was to the employees who bag potatoes in sacks. At the alfalfa pellet manufacturing area, it was the operator of the pellet mill who had the highest exposure. Area measurements taken in all three facilities supported the high noise levels observed with personal dosimetry.

At the swine confinement facility, NIOSH investigators recommended that employees be enrolled in a hearing conservation program,

properly maintain their hearing protection devices, and replace or pad some of the metal pieces with softer material to prevent metal-to-metal contact. At the potato processing plant, NIOSH investigators offered assistance in choosing hearing protection devices that may improve communication between employees. At the alfalfa pellet operation, NIOSH investigators recommended that the pellet mill operator be enrolled in a hearing conservation program and limit the time spent outside the control booth.

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PARTICIPATORY APPROACH IN OCCUPATIONAL HEALTH OF HISPANIC FARMWORKERS IN THE "LAKE REGION." M. Vela Acosta, University of Texas, Brownsville, TX; V. Fischer, D. Reding, Marshfield Clinic, Marshfield, WI; S. Cooper, Texas A & M University, Bryan, TX.

Background. Innovative models that incorporate participatory research to reduce the occupational risk for a seasonal farmwork force require regional partnerships. Interventions in states not traditionally known for large Hispanic populations place distinctive challenges on services not designed for Spanish-speaking workers. **Methods.** A practical occupational health assessment of agricultural sites in the "Lake Region" (Wisconsin, Michigan, and Minnesota) was conducted. Selective on-site safety audits ($n = 7$) assessed agricultural employers' and farmworkers' safety risks and needs in the three states. The incidence of occupational health outcomes of farmworkers during that agricultural season was estimated through examination of clinical health records of farmworkers in Wisconsin. All information gathered from agricultural employers, health records, and farmworkers was used to determine the effectiveness for this intervention.

Results. Main hazards found during the on-site audits were ergonomic risk factors, field sanitation, insect bites, and lack of Spanish bilingual training materials. Incidence rates of nonfatal occupational injury and lost workday cases exceeded the national average at one Christmas tree operation by almost seven times. At the migrant health clinic of Wisconsin, 21% of the farmworkers' medical visits (284 out of 1368) were due to occupational related problems, with the highest incidence for musculoskeletal diseases. **Conclusions.** This participatory approach, which included agricultural employers, migrant agencies, and researchers, demonstrated potential to benefit the occupational health and safety of farmworkers in the Lake Region through enhanced resources and services. Additional research efforts are required to implement this approach to a wider range of agricultural employer sites.

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FINAL GUIDELINES FOR THE TRAINING OF WORKERS ENGAGED IN WORK ASSOCIATED WITH MOLD. T. Outwater, NIEHS, Research Triangle Park, NC; B. Lippy, National Clearinghouse for Worker Safety and Health Training, Washington, DC; D. Dobbin, Society for Occupational and Environmental Health, Washington, DC.

A rise in concern for the potential health effects and property damage claims associated with the presence of mold in buildings has led to an increase in the number of mold remediation workers. These workers, along with building maintenance workers, conduct their activities in mold contaminated environments in the absence of regulations, generally accepted professional guidance on work practices and procedures, personal protective equipment, or training protocols to protect them from mold exposures.

This panel will present and discuss the final guidelines for training mold maintenance and remediation workers that have been developed as a result of a collaborative process between the National Institute of Environmental Health Sciences Worker Education and Training Program, the Association of Occupational and Environmental Clinics, the Society for Occupational Safety and Health, Hunter College CUNY, Johns Hopkins Bloomberg School of Public Health, the University of Medicine and Dentistry N.J., the New York City Department of Health, and the National Clearinghouse for Worker Safety and Health Training.

The draft guidelines have been reviewed and commented upon by scientific, medical, and worker training experts from numerous public and private organizations including the American Industrial Hygiene Association. These final guidelines, which identify key components for an effective mold-related worker training program, have been revised to incorporate many of these comments.

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E-LEARNING IN HEALTH AND SAFETY MANAGEMENT—THE CCOHS EXPERIENCE. B. Pathak, C. Moore, Canadian Centre for Occupational Health and Safety, Hamilton, ON, Canada.

The objective of this paper is to discuss the rationale, requirements, and effectiveness of web-based health and safety management training. Health and safety legislation in most of the developed countries is based on the internal responsibility system. In this system, employers are required to provide a safe workplace. Managers and supervisors must meet these requirements by integrating health and safety as

an essential component of their routine management responsibilities. In order to do this, managers and supervisors must receive appropriate health and safety training. We will present the pros and cons of using "e-learning" programs to deliver health and safety management training. Based on CCOHS' staff experience developing its "Health and Safety Training for Managers and Supervisors" e-course and detailed discussions with course participants, we will discuss the following: rationale for creating and presenting e-courses; the requirements for a successful e-course; evaluating the course's effectiveness based on communication with participants by telephone and e-mail; and lessons learned. Based on our experience and user feedback, we have concluded that an e-learning program can be an effective tool for health and safety management training provided that participants can communicate with a course instructor when they have questions or concerns.

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TRENDS AND CONSIDERATIONS FOR MULTILINGUAL HAZMAT COMPLIANCE. J. Kraus, 3E Company, Carlsbad, CA.

Companies that expand their operations into foreign markets encounter a myriad of issues including EH&S and hazmat regulatory compliance requirements. There are several complex issues that go far beyond just simple language translation. These issues range from researching the various regulations and understanding each country's level of enforcement, the complexity of international phone numbers and providing emergency response (not all countries have "911"), dealing with unique waste disposal requirements, the complexity of training, and also accommodating MSDSs for products whose ingredients vary from country to country.

This talk will address the multiple layers of issues companies face and the steps they need to be taking and considering when addressing multilingual issues. It will also incorporate how a Fortune 500 organization adapted to multilingual, global issues and will walk the audience through some of the processes it put in place.

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DEVELOPMENT OF AN EFFECTIVE OSH ACADEMIC PROGRAM ASSESSMENT: TRIALS AND TRIBULATIONS OF A FLEXIBLE PRACTITIONER PROGRAM. J. Zey, A. Greife, D. Laster, CMSU, Warrensburg, MO.

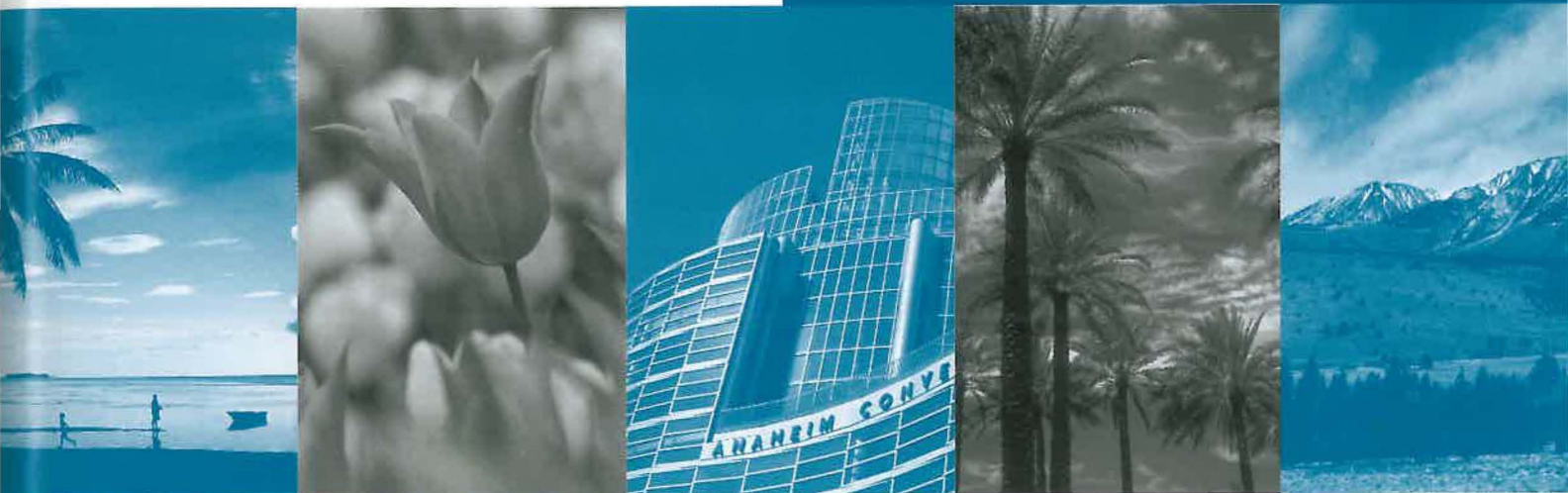
Central Missouri State University (CMSU) has graduated over 3000 students with degrees in industrial hygiene and occupational safety between 1969 and 2004. Approximately 70% of the 500 industrial hygiene graduates are still practicing in the occupational safety and health field. Alumni have been very successful. In the late 1980s, 17% of all NIOSH certified industrial hygienists had degrees from CMSU. Currently 32% of AIHA technical committees have CMSU alumni as members. Finally,

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