115.

CONTROL OF OCCUPATIONAL EXPOSURE TO HAZARDOUS DRUGS. G. Burroughs, NIOSH, Cincinnati, OH

Many of the prescription pharmaceuticals that improve the health of ill people have just the opposite effect on the healthy workers involved in their preparation and administration. NIOSH research into the evaluation and control of occupational exposures to hazardous drugs, chiefly those used for cancer chemotherapy and HIV treatment, was initiated to determine the effectiveness of controls to reduce all routes of exposure for pharmacy workers who prepare the drugs for use and the nursing staff who administer these medications. A working group of approximately 50 representatives from organizations with interest in this problem was formed to collaborate on this investigation. That working group approached this problem looking at the applicability of each element of the hierarchy of controls, that is engineering control, administrative control, and personal protective equipment (PPE).

This presentation reviews the NIOSH Alert developed in this project, and outlines the major findings to date in the control of exposures. The Alert defines a hazardous drug, describes the problems associated with their use, summarizes current exposure guidelines and control recommendations, and provides case studies. Other control findings beyond those presented in the Alert include: 1) data on the level of worker protection provided and varying air flow patterns utilized by biological safety cabinets used in this work, 2) effectiveness of devices to reduce aerosolization of product, 3) distribution of information and development of training for potentially exposed individuals, and 4) results of a laboratory evaluation of the permeability of a variety of PPE materials to selected drugs. Future work calls for an intervention study that looks at the effectiveness of a variety of engineering controls by monitoring air and surface drug levels before and after the introduction of those controls.

116.

UTILIZATION OF A MODIFIED GLUTARALDEHYDE ANALYTICAL METHOD—RESULTS AND RAMIFICATIONS. S. Derman, MediSHARE Environmental Health & Safety Services, Cupertino, CA

Since before the American Conference of Governmental Industrial Hygienists (ACGIH) lowered the glutaraldehyde Threshold Limit Value (TLV) from 0.2 ppm to 0.5 ppm, both as Ceiling concentrations, the existing methods of evaluating an employee's exposure were lacking. Though the TLV is based on a Ceiling exposure, the OSHA 64 and NIOSH 2532 Analytical Methods both describe a collection period of fifteen minutes. In consultation with the OSHA Analytical Laboratory and the NIOSH contract laboratory, the OSHA analytical method was modified so as to significantly lower the minimum level of detection.

Over 200 air samples were collected in health care facilities utilizing the lowered level of detection with a one-minute sampling period. Because several work process were less than two minutes in duration, a fifteen minute sampling period would be considered excessive. The results of the sampling demonstrated several overexposures to the TLV which would have gone undetected by the existing Methods. This paper will describe the overall results of the testing and the work processes involved in creating such exposures.

117

MICROBIOLOGICAL CONTAMINATION IN A LARGE METROPOLITAN HOSPITAL FOLLOWING A LOCALIZED, BURST-PIPE INDUCED, FLOODING EVENT. K. Martinez, NIOSH, Cincinnati, OH

In July 2001, NIOSH conducted a health hazard evaluation in a large metropolitan hospital to evaluate suspected microbiological contamination in a newly constructed, unoccupied surgical intensive care unit (SICU), adjacent offices, and laboratory space. Concern regarding suspect microbiological contamination was initiated subsequent to a brief flooding event resulting from a pipe that burst in the ceiling of the SICU. An industrial hygiene consultant had recommended major remediation activities including complete tear-out of gypsum wallboard following a moisture intrusion survey that identified significant wetting of building materials.

The NIOSH investigation included a walk-through assessment of moisture affected areas, a review of building design plans, the collection of environmental measurements (temperature and relative humidity), a moisture content survey of building materials, the collection of bulk samples to assess microbiological contamination, and air samples of wall cavities.

The walk-through assessment and moisture survey confirmed previously identified areas of moisture-laden building materials, predominantly in the SICU gypsum wallboard. SICU gypsum wallboard moisture readings ranged to 50% (on the relative scale) one month after the flooding event; this is in contrast to other water impacted areas on the first and second floors which were at or slightly above background. Fungal concentrations from bulk material samples ranged from no growth to 6.8x106 colony forming units per gram of material (CFU/m3), predominantly Penicillium species. Observation of wall cavities with a borescope revealed limited microbiological contamination. However, in-wall air samples indicated concentrations up to 6.8x106 CFU/m3, predominantly Penicillium species, which was consistent with the bulk sample results. Recommendations for remediation activities were reduced to focus on the lower sections of walls.

118.

REAL-TIME PCR METHOD FOR DETECTING AND ENUMERATING *LEGIONELLA* FROM ENVIRONMENTAL SAMPLES. R. Miller, C. Martinez-Miller, Aerotech Laboratories, Phoenix, AZ

Though the culture method remains the "gold standard" for detecting *Legionella*, it unfortunately requires over 10 days to complete, precious time that could be used to prevent further exposures. Immunological approaches have also been utilized, but this technique lacks sensitivity and cannot distinguish living from dead cells. A more sensitive method, and one that only requires a few hours to complete, is polymerase chain reaction or PCR, for short. Like the immunological technique, the major disadvantage to PCR is its' inability to distinguish dead from live bacteria. However the PCR method provides a powerful screening tool for very rapidly detecting the bacterium in environmental samples. In fact, unless the environment has been altered, such as with a biocide, moderate to high populations detected by PCR are usually indicative of a potential source. We developed a real-time PCR technique by modifying a conventional PCR method reported in the scientific literature. The system utilizes primers targeted for a region of the 16S rRNA gene and can detect DNA equivalent to less than 1 bacterial cell per reaction. None of the non-*Legionella* Gram-positive or Gram-negative bacteria tested were amplified in the system. Six pathogenic species of the pneumophila group (*L. pneumophila, L. feeleii, L. micdadei, Fluoribacter bozemanii* and *F. dumoffii*) were amplified by one set of primers and by refining this system with a proprietary primer system, we were able to distinguish *L. pneumophila* specifically. We also modified the system to permit quantitative analyses via real-time PCR using fluorescent methods including SYBR Green and fluorescent-labeled probes. The analysis only took about 40 minutes to complete after DNA extraction, allowing the rapid turn-around necessary for a presumptive screen, facilitating earlier implementation of disinfection processes and reducing human exposures.

119.

PATIENT HANDLING AT A MAJOR MILITARY MEDICAL CENTER. K. McCoskey, M. Callison, M. Lopez, U.S. Army, Aberdeen Proving Ground, MD

Musculoskeletal disorders exact an unacceptable toll on the health and patient care abilities of nursing staff. Typical nursing tasks include transferring patients from bed to wheelchair, rolling patients in bed and lateral transfers from bed to stretcher. Staff are forced to adopt extreme postures to perform these tasks, increasing the risk of injuries. Hospital units often consist of rooms that are too small, with too much equipment to allow ideal patient handling positioning. How is a nurse affected when they must push a bed away from a wall to access each side? Staff that perform

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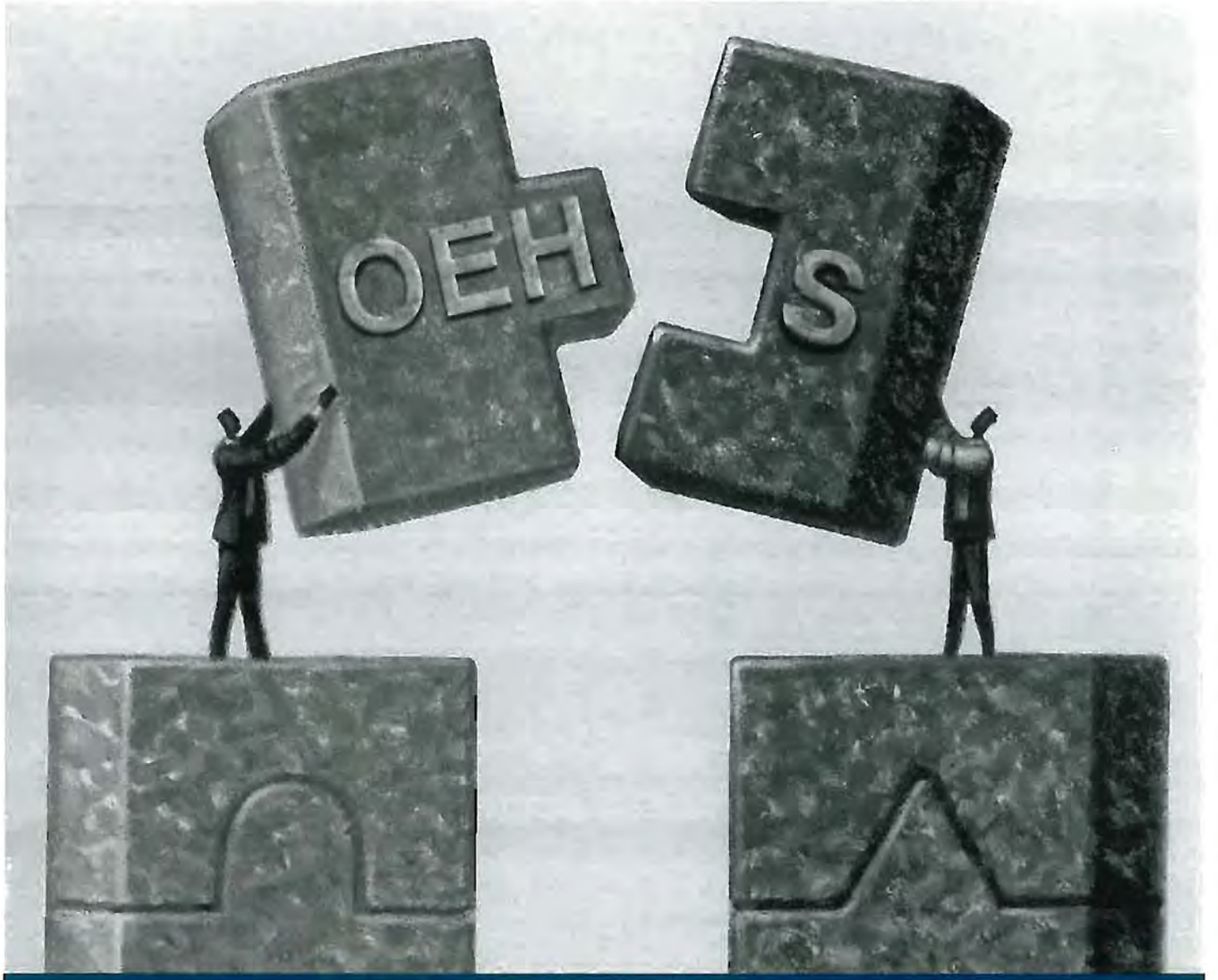

ABSTRACTS

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2002 Abstract Index by Session Topic

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/m^3, 10.01 ±8.84 mg/m^3; endotoxin 6046±6089 EU/m^3, 5457±5934 EU/m^3 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 FEV_1, 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