Hence, determining dust control efficiency of the equipment before installation is valuable.

This dust control validation study is being carried out at pharmaceutical plant modification in India. The modification is primarily made to reduce dust exposures. Dry lactose of particle size less than 75 microns is used as a surrogate. Ninety personal and area air samples are being collected. Fugitive emissions of dust are being determined by conducting area air sampling at a distance of 1.5 feet from the source. The sampling is conducted during a dry run of a unit operation (e.g., milling) with dust control in place (e.g., vacuum transfer). Lactose is run three times during the dry run and two samples are collected during each run. The equipment is installed after a dust control efficiency of 20 ug/cubic meter is achieved. An American Industrial Hygiene Association Accredited Laboratory in the USA is analyzing the samples.

Initial data obtained during similar work done elsewhere within the same company indicated lactose concentrations above 20 ug/cu m during pharmaceutical unit operations. Dust containment modifications made subsequently reduced the concentrations below 20 ug/ cum. This work indicated that determining dust control efficiency of 20 ug/ cu m with Lactose is feasible during pharmaceutical unit operations.

145.

EFFICIENCY CHANGES FOR FILTERS MADE FROM FIBERS CARRYING ELECTROSTATIC CHARGE. P. Raynor, S. Chae, A. Streifel, University of Minnesota, Minneapolis, MN; C. Kern, Johns Manville Corporation, Vienna, WV

Filters made from many kinds of fibers are available for removing particles from air in ventilation systems. Often, filters are produced using fibers that carry an electrostatic charge. The enhanced collection of small particles by electrostatic mechanisms allows creation of filters that operate with less pressure loss without sacrificing particle collection efficiency. However, laboratory tests suggest that the effectiveness of the electrostatic charge can decrease as the filter is used. The practical importance of the charge was evaluated by measuring the efficiency of two kinds of filters, one with fibers carrying a charge and the other with uncharged fibers, in two functioning air supply units for four months. The units were nearly identical: they supplied only outside air, had adjacent air intakes, and possessed the same type of housing and blower. Thirty filters with electrostatically enhanced fibers were placed in the filter bank of one unit while thirty of the comparison filters were positioned in the other housing. After the blowers were started, filter efficiency measurements were conducted on ambient aerosol using real-time particle sizing instruments. These measurements were repeated throughout the next four months. The filters carrying the electrostatic charge exhibited substantial efficiency losses during the test. For example, the collection efficiency for particles 1.0 micrometer in diameter decreased from 90% to 60% during the first three months of the test. For particles 0.3 micrometer in diameter, the efficiency decreased from 70% to 55%. The efficiency of the filters with uncharged fibers remained constant with time. These findings suggest that persons responsible for selecting control filters should consider the possibility that filters made from fibers carrying electrostatic charge may exhibit efficiency reductions as they are used in ventilation systems.

146.

EVALUATION OF EXISTING TECHNOLOGIES FOR THE CONTROL OF WORKERS' EXPOSURES TO HEXAVALENT CHROMIUM-CONTAINING MISTS, DUSTS, AND FUMES. L. Blade, M. Wallace, A. Khan, J. Topmiller, K. Crouch, J. Bennett, NIOSH, Cincinnati, OH; M. Story Yencken, J. Catalano, Battelle, Seattle, WA

The National Institute for Occupational Safety and Health (NIOSH) conducted 21 field surveys in selected industries, to characterize workers' exposures to hexavalent chromium-containing airborne particulate and evaluate existing technologies for controlling these exposures. Hexavalent chromium (Cr[VI]) is a respiratory irritant, and chronic inhalation may cause lung cancer. Primary evaluation methods included collection of full-shift, personal breathing-zone (PBZ) air samples for Cr(VI), measurement of ventilation-system parameters such as hood face velocities, and recording of descriptive information about processes and work practices. This presentation is a follow-up to one presented at the 2001 AIHce summarizing the findings of 12 selected field surveys. The current presentation summarizes findings from the remaining nine surveys. One survey evaluated a ship-breaking facility's metal-cutting operations on chromium-containing materials. Full-shift PBZ exposures up to 27 micrograms of Cr(VI) per cubic meter of air (ug/m3) were measured outside the supplied-air respirators used by the workers, exceeding the 1 ug/m3 NIOSH recommended exposure limit (REL). Another field survey evaluated a shipyard's welding operations, where Cr(VI) was present in the fume generated when welding on stainless steel. None of the workers' exposures, which ranged from less than the minimum detectable concentration to 0.96 ug/m3, exceeded the REL, despite inconsistent use of local exhaust-ventilation systems. Other operations evaluated include chromium electroplating, welding in construction, a stainless-steel foundry, chromate-paint removal with abrasive blasting, alloy-spray coating, and the manufacture of prefabricated concrete products and treated-wood products. Based on results of these surveys and those previously reported, NIOSH researchers have concluded that, in some operations evaluated, hexavalent chromium exposures less than the current NIOSH REL are achievable with good exposure-control measures, while in others, it is unclear if exposures below this level are achievable with existing technology.

147.

ENGINEERING CONTROL OF AIRBORNE CONTAMINANTS AT A MICROWAVE POPCORN PACKAGING PLANT. R. Boylstein, C. Piacitelli, G. Kullman, W. Jones, NIOSH, Morgantown, WV; W. Heitbrink, NIOSH, Cincinnati, OH

Severe respiratory disease has been reported in several workers in a microwave popcorn packaging plant. NIOSH was requested to find the cause and make recommendations for control. After providing initial respirator training and fit testing for workers in the highest exposure categories, attention turned to engineering solutions.

Qualitative sampling for volatile organic compounds (VOCs) indicated that ketones including diacetyl, acetoin, methyl ethyl ketone (MEK), and 2-nonanone were predominant. Direct reading monitors were used to identify exposure point sources for VOCs and real time area aerosol measurements were collected in the form of a matrix throughout the production area. In order to relate workplace dynamics to exposure, real time personal aerosol measurements were time-synchronized with video signals captured during various activities. Diacetyl was selected as a marker agent and personal and area samples were collected for this compound.

The microwave mixing room was the primary point source for VOC exposures, and initial engineering changes involved increased ventilation and isolation of this area. Overlay of the direct reading aerosol data onto video helped us to pin-point specific work practices which resulted in increased exposure and recommendations to modify such practices were made. Comparison of measurements made before and after these changes showed a 3- to 12-fold drop in diacetyl concentration for specific personal and area sampling pairs. Total organic vapor concentrations also fell markedly for various production line jobs.

The long-term effect of these and future engineering exposure control changes will be assessed through longitudinal environmental and clinical study.

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148.

BIOTERRORISM AND EMERGING INFECTIONS: OCCUPATIONAL PHYSICIAN AWARENESS, PERCEPTION AND INFORMATION NEEDS PRIOR TO AND FOLLOWING SEPTEMBER 11. D. Sterling, B. Clements, T. Rebman, B. Shadel, R. Thomas, R. Evans, Saint Louis University, St. Louis, MO

Introduction: Prior to September 11, in response to the increasing threat of bioterrorism (BT) or an emerging infection (EI) out-

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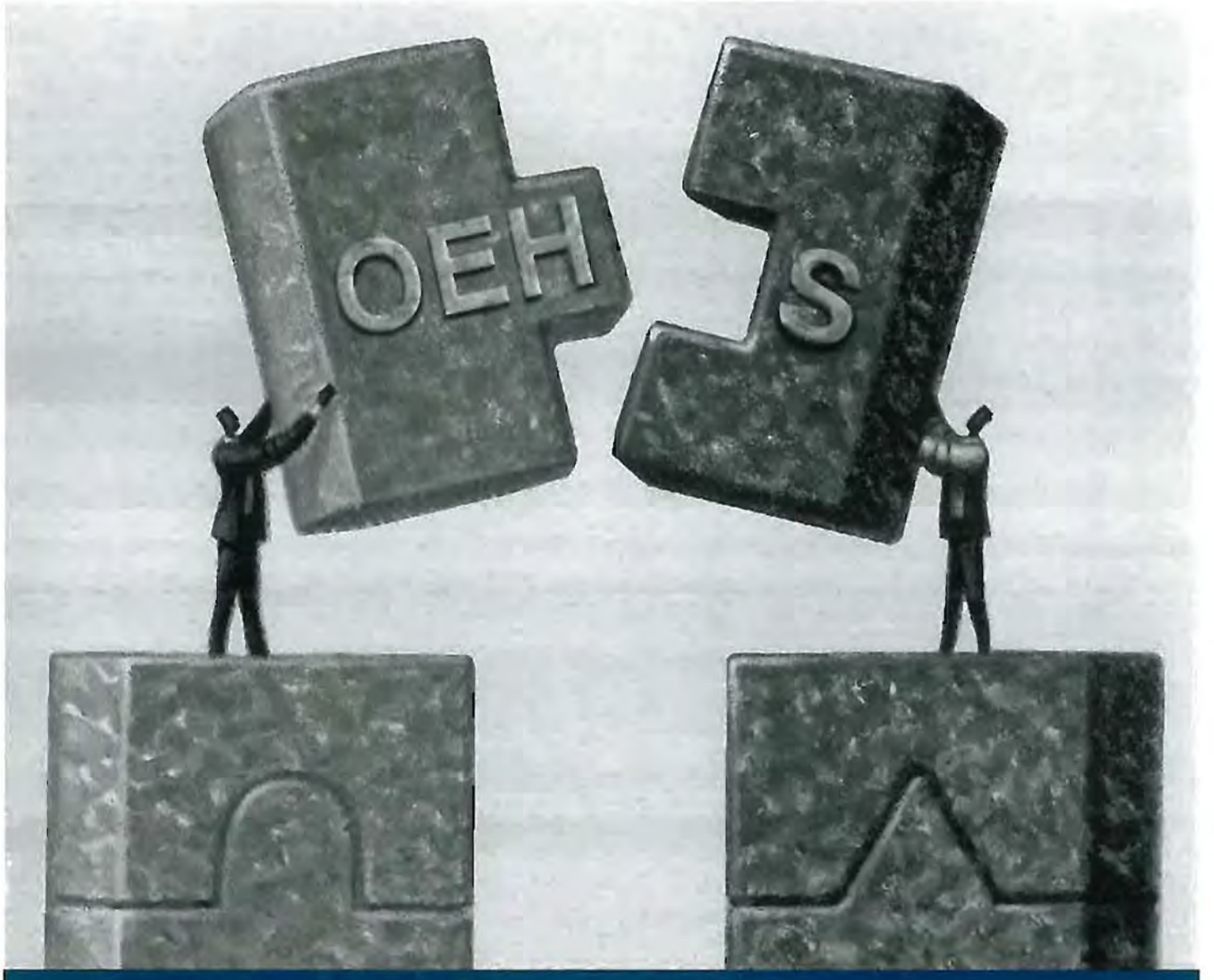

ABSTRACTS

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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