gram and required to wear NIOSH approved dust masks. Additional sampling conducted after the exhaust hood was installed verified the effectiveness of the engineering design. Personal breathing zone concentrations ranged from to 2.9 to 4.4 mg/m^3.

Ventilation

Papers 421–423

421.

EVALUATION OF ALTERNATIVE HVAC FILTERS: EFFECT ON FLOW RATE, CAPITAL EXPENSE, MAINTENANCE COSTS, AND ENERGY CONSUMPTION CONSIDERATIONS. P. Jensen, E. Moyer, S. Berardinelli, J. Hayes, S. Fotta, NIOSH, Morgantown, WV.

The National Institute for Occupational Safety and Health (NIOSH) has undertaken a study to evaluate the characteristics of selected HVAC systems. This particular phase of the study looked at the flow rate through various inlet bag filters, their initial cost, and maintenance considerations including change out recommendations and energy considerations. Originally, three different filter types were located in the evaluated air handler. The three filter types included a 6-bag, a 12-bag, and a pleated V-panel design. Air velocities ranged from 205 to 1,090 feet per minute, depending on filter type. These air handlers held 32 24"x24" filter assemblies. Air velocities were inversely correlated with resistance across the filter media. When all the filters were replaced with new pleated V-panel design filters, which had the lowest resistance, a reduction in flow velocity through each V-bank filter was measured. A significant reduction in energy consumption was noted in this variable air-volume system with a variable frequency drive motor. The added benefits of reduced maintenance and extended filter lifetime was addressed. Although the initial cost of the pleated V-panel filters is higher than that for 6- or 12-bag filters, the overall facilities overhead costs might be reduced since the service life of these filters is stated to be twice that of the bag filters. Further, the pleated V-panel filters are more efficient over their lifetime; hence, the build up of material in the building and on the HVAC coils from recirculated air should produce additional savings in maintenance and energy costs.

422.

VEHICLE EXHAUST FLOW RATES VERSUS ENGINE SPEED IN DESIGN OF VEHICLE EXHAUST EXTRACTION SYSTEMS. J. Keithley, A. Belden, U.S. Army CHPPM, Aberdeen Proving Ground, MD

A study was conducted to compare vehicle engine exhaust volumes against specific engine speeds. The study was designed to provide data necessary in designing vehicle exhaust extraction systems in maintenance shops. Currently, there is little information available regarding the exhaust volumes from heavy-duty vehicles. Inadequate sizing of vehicle exhaust extraction systems would result in the potential overexposure of personnel to vehicle exhaust components.

Measurements were taken of various sized engines operating at differing engine speeds. Measurements were taken by using a Pitot tube, manometer, and thermometer. A six-inch round aluminum pipe was constructed to allow measurements to be taken at a point 7 1/2 duct diameters downstream and 1 1/2 duct diameters upstream of sources of airflow turbulence. Adapters were made to fit the 6' pipe to the exhaust systems of specific vehicles. Results of engine exhaust volume verses engine speed were plotted to give a linear relationship. The data provides necessary information for design of a vehicle exhaust extraction system based on actual exhaust volumes for the vehicles being maintained in the maintenance shop.

In conclusion, the results were compared to recommendations made by ACGIH Ventilation Manual and by other existing Army guide specifications. The results show that there is a need for revised design guidance for vehicle exhaust extraction systems, which will assure adequate removal of exhaust.

423.

SHROUDS REDUCE DUST FROM GRINDING CONCRETE. A. Echt, S. Shulman, D. Watkins, R. Kovein, NIOSH, Cincinnati, OH; W. Heitbrink, University of Iowa, Iowa City, IA

When construction workers use hand-held grinders to smooth poured concrete surfaces after forms are stripped, they risk overexposure to respirable dust and crystalline silica. A previous study at a stadium construction site revealed TWA respirable crystalline silica exposures that ranged from 56 to 830 µg/m^3 (the NIOSH REL is 50 µg/m^3) and TWA respirable dust concentrations ranging from 0.38 to 6.9 mg/m^3. Silicosis is an occupational respiratory disease caused by inhaling respirable crystalline silica dust. Silicosis is irreversible, often progressive (even after exposure has ceased), and potentially fatal. Exposure to silica dust occurs in many occupations, including construction. Because no effective treatment exists for silicosis, prevention through exposure control is essential. The study described here compared the exposures during the use of off-the-shelf local exhaust ventilation shrouds with that of no shroud. The aim was to quantify the exposure reduction that could be achieved through the use of shrouds, and to compare shroud effectiveness. Two grinders from different manufacturers were studied, at two different study sites. Two shrouds were evaluated for each type of grinder for a total of four shrouds. The grinder with no control varied from site to site, since this was furnished by the employer. The same vacuum cleaner was used to provide exhaust air flow at both sites. An aerosol photometer was paired with an SKC aluminum cyclone to measure respirable dust exposures in the cement mason's breathing zone. Video exposure monitoring was used to assist in task analysis. With 95% confidence, the results indicated at least 90% reduction due to the controls for each of the four shrouds at an average flow rate of 135 cfm. Results indicate little difference between the reductions in the different grinder/shroud pairings. This study demonstrated effective control can be achieved for hand-held grinding of concrete.

Computer Applications

Papers 424–428

424.

WORKING TOGETHER ON ENVIRONMENTAL PROGRAMS: THE TRANSPORTATION RESOURCE EXCHANGE CENTER (T-REX). M. White, N. Bennett, ATR Institute, University of New Mexico, Albuquerque, NM

The Transportation Resource Exchange Center (T-REX) is a first-of-its-kind Virtual Library dedicated to answering questions regarding the transportation of radioactive materials (RAM) to stakeholders, and is online at http://www.trex-center.org/. The ATR Institute at the University of New Mexico has developed the T-REX Center under a cooperative agreement with the National Transportation Program of the U.S. Department of Energy.

The Website was created to serve as a "one-stop shop" source for information, to facilitate public involvement, overcome information gaps, and foster clearer communication and understanding between stakeholders. This online national clearinghouse for information contains a broad range of subject categories including Carriers, Education/Training, Emergency Management, Environment, Health, Laws, Packaging, Public Participation, Routes, States, Students/Teachers, and Tribal. The searchable T-REXDEX database contains over 1,900 documents on these subjects.

The T-REX staff designed and engineered the Virtual Library to be a well-developed, finely crafted conduit for the seamless flow of documents and data in the information stream between the producers, users, and repositories of information regarding RAM transport. Because stakeholders are a diverse group with varying knowledge and expertise, the T-REX Website is designed and maintained to meet their differing needs. The ultimate objective of the T-REX is that individuals who create and contribute the information regarding radioactive transport become T-REX Web site users, and those individuals who are already patrons will become T-REX information producers/contributors, thereby bringing diverse people together to work together for the betterment of environmental health and safety.

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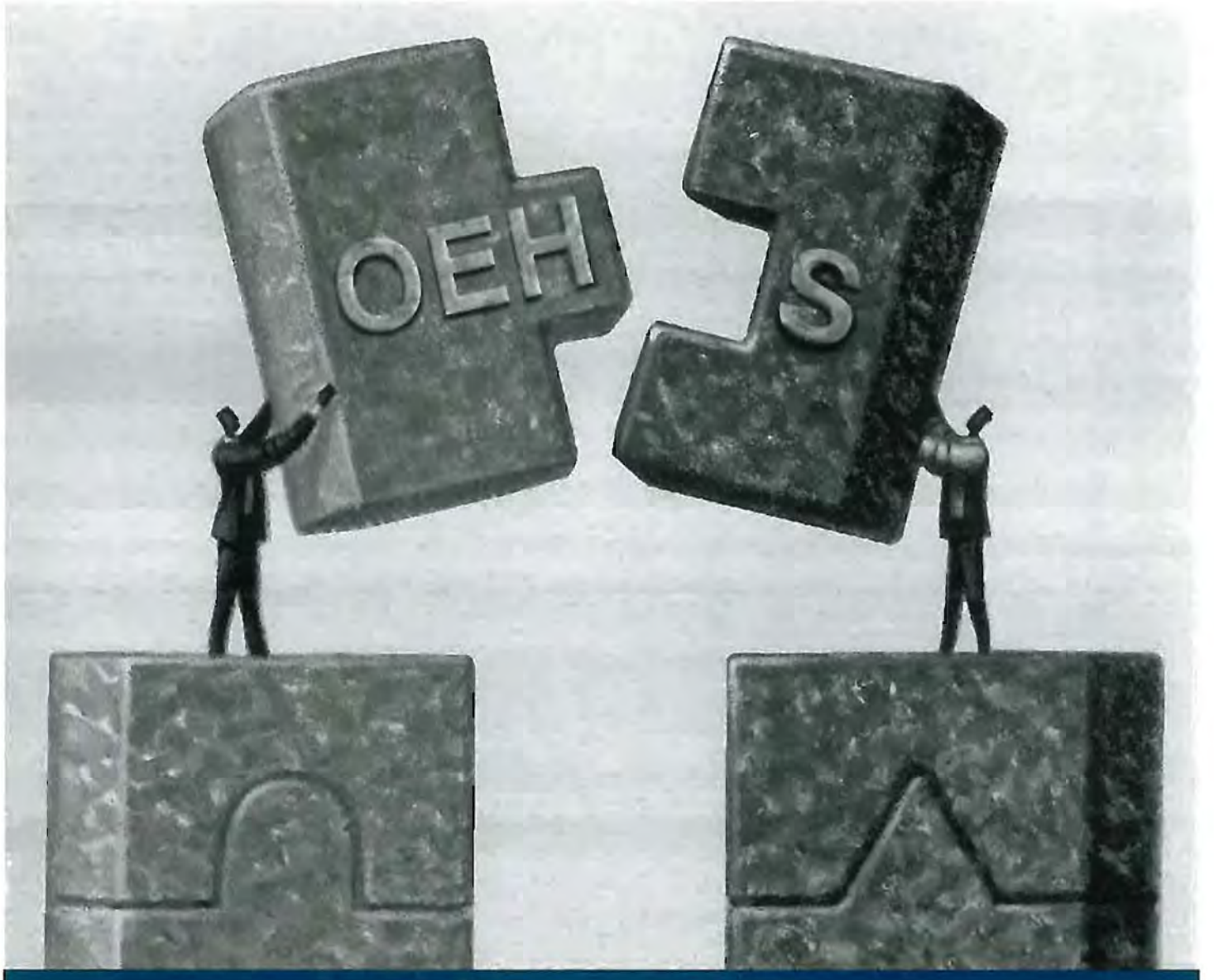

ABSTRACTS

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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