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AN EVALUATION OF BIOAEROSOL PARTICULATE IN ELEMENTARY SCHOOL CLASSROOMS. K.H. Bartlett, S.M. Kennedy, M. Brauer, B. Dill, C. vanNetten, University of British Columbia, Vancouver, B.C., Canada

Public concern about biologic contamination of indoor air and the perception of the impact of indoor air on personal health have been increasing. To examine the spectrum of potential exposures to bioaerosols and possible determinants of exposure, a 2-year study of elementary school classrooms was begun in 1996. All 39 schools from one British Columbian school district were enrolled to ensure different building ages and construction materials, but the same maintenance protocols. Schools were randomly assigned to a winter, spring, or fall sampling period. Three rooms were studied at each school. Data collected included number of occupants and patterns of occupancy, CO_2 levels, temperature and percent relative humidity (%RH), total particulate, and air exchange rates using tracer gas (SF_6) and CO_2 decay. Indoor and outdoor bioaerosols were collected using an Andersen N-6 impactor onto media formulated for the culture of fungi or bacteria. Bacteria and fungi were identified using standard microbiological techniques using differential stains and/or phase contrast microscopy.

Indoor levels of bacteria were, on average, an order of magnitude higher than outside levels (geometric mean 214 vs. 19 CFU/m^3, $p<0.001$) and were all gram-positive organisms. Indoor fungal counts ranged from 32 to 2495 CFU/m^3. There was a trend for winter indoor fungal levels to be lower (geometric mean 189 CFU/m^3) than either spring (g.m. 296 CFU/m^3) or fall (g.m. 393 CFU/m^3) ($p<0.02$) in parallel with lower interior %RH ($p<0.002$). In the fall sampling there were significantly higher counts of xerophilic fungi (g.m. 122 CFU/m^3) ($p<0.002$). Some of the potentially allergenic fungal genera isolated indoors included *Aspergillus fumigatus, A. niger, Aureobasidium, Botrytis, Cladosporium, Eurotium, Penicillium, Paecilomyces, Rhizopus,* and *Trichoderma*. Control of exposures to indoor fungi was related to the air handling system of the school.

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REMOVAL OF 60 TONS OF MANURE FROM A BUILDING: PROTECTING WORKERS AT RISK. S.W. Lenhart, M. Schafer, NIOSH, Cincinnati, OH

An accumulation of pigeon manure was removed from the twelfth floor of a prison's administration building before removal of an empty 150,000-gallon water tank and the building's demolition. Sixty tons of manure were removed using a long, flexible hose connected to a trailer-mounted, industrial vacuum system. Removal workers wore full-facepiece, powered air-purifying respirators and disposable coveralls, gloves, and shoe coverings.

Twelve manure samples were collected outside the water tank, 8 were collected inside the tank, and 5 soil samples were collected near the building's foundation. Using standard fungal culturing methods, each sample was analyzed for three potentially infectious microorganisms: *Blastomyces dermatitidis, Cryptococcus neoformans,* and *Histoplasma capsulatum*. A handheld aerosol monitor was used to measure air concentrations of dust aerosolized during manure removal. Air sampling was also conducted near the vacuum equipment and waste hopper and in a parking lot to estimate background dust concentrations.

C. neoformans was recovered from 4 of 12 manure samples collected outside the water tank and from 7 of 8 samples collected inside the tank. No sample was found to contain *H. capsulatum* or *B. dermatitidis*. During most removal activities, airborne dust concentrations ranged from 0.8 to 1.5 mg/m^3. Airborne dust increased to 3.0 mg/m^3 during dry shoveling, and to greater than 20 mg/m^3 during a brief period of dry sweeping. Airborne dust concentrations near the waste hopper and in the parking lot were 0.03 mg/m^3.

C. neoformans causes cryptococcosis and is often found in bird manure accumulations. Formerly a rare infectious disease, the incidence of cryptococcosis has increased because of its frequent occurrence among HIV-infected persons. Recovery of *C. neoformans* from manure samples and dusty working conditions suggested that the exposure precautions taken by removal workers were necessary.

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SUSTAINING A LATEX CONTROL PROGRAM IN A LARGE BIOMEDICAL FACILITY. J.F. McCarthy, B. Weeks, N. Moss, Environmental Health & Engineering, Inc., Newton, MA

This presentation examines the challenges in maintaining an effective latex control program in a large biomedical facility. The identification of appropriate nonlatex substitutes and low-allergen containing gloves is a key initiative in establishing a successful latex control program. Often, the substitutes or low allergen alternatives represent a significant increase in expenditures. Conflicting priorities (cost containment and providing a low-risk environment) can encroach upon EH&S program goals.

As the health care industry forms new networks and affiliate markets it is critical for the industrial hygienist to be an integral part of the procurement and product review process. Experience with supply problems of approved products dictates the necessity for maintaining good communication with vendors/manufacturers while specifying product needs. External pressures to continue to identify new alternatives, introduction of new materials/kits, and cost control initiatives dictate the need to maintain an aggressive program. Therefore, latex control programs must involve the continued testing of all new products prior to being introduced into the facility and periodic testing of products already in use.

Establishing latex-free crash carts for medical procedures and latex-safe kit tote for patients' personal use are instrumental in preventing further sensitizations to latex and protecting currently sensitized individuals.

The industrial hygienist has several metrics for evaluating the program effectiveness. Air monitoring, wipe samples for residual allergen proteins, and reduction of number of cases are a few parameters that can be utilized. Latex control program involves the continued initiative and education of staff, vendors, and purchasing departments.

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NITRIC OXIDE AND NITROGEN DIOXIDE EXPOSURE MODELING FOR HEALTH CARE WORKERS INVOLVED IN NITRIC OXIDE TREATMENT. J. Tomey, T.A. Hall, M.L. Phillips, C. Brown, K. Sekar, A. Cersian, M. McCoy, University of Oklahoma College of Public Health, Oklahoma City, OK

Recent biomedical research has demonstrated that nitric oxide (NO) is an important biological mediator of pulmonary vasodilation. NO is currently undergoing clinical trials for use in the treatment of persistent pulmonary hypertension in infants.

NO is familiar to industrial hygienists as a combustion by-product and common industrial pollutant. NO exposures above the threshold limit value of 25 ppm can result in increased methemoglobin formation and potential neurotoxicity. Additionally, at elevated concentrations NO reacts rapidly with air to form nitrogen dioxide (NO_2), a potent respiratory irritant with a TLV-TWA of 3 ppm and a TLV-STEL of 5 ppm.

A personal exposure-modeling program was undertaken to determine potential NO and NO_2 exposures of employees in a neonatal ward during administration of NO to infants. An I-NOvent delivery system (Ohmeda Inc.) was used to dilute 400 ppm NO gas from a cylinder to 20 ppm in oxygen for delivery to the ventilator for simulated patient administration. A typical NO administration team includes a respiratory therapist and a nurse practitioner. Toxi Ultra datalogging dosimeters (Biosystems Inc.) were used to determine personal breathing zone concentrations of NO and NO_2 during the setup, simulated use, and disassembly of the NO delivery system. NO and NO_2 emissions from vent ports on the I-NOvent and the associated ventilator were also monitored. Modeling was conducted using standard and oscillatory ventilators. Multiple experimental runs were conducted for each ventilator configuration. Personal dosimetry results indicate that peak personal exposures to NO were below 2.0 ppm. NO_2 concentrations were below quantifiable levels (~1 ppm). These modeling results indicate that potential exposure to NO and NO_2 during setup, use, and breakdown of the I-NOvent system is below applicable TLVs, but the potential for exposure could be further reduced by scavenging residual gas from the system.

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EVALUATION OF OCCUPATIONAL EXPOSURES AT MEDICAL WASTE TREATMENT FACILITIES. P.A. Jensen, NIOSH, Cincinnati, OH; K. Leese, E. Uhorchak, L. Hodson, M. Owen, Research Triangle Institute, Research Triangle Park, NC; E. Cole, DynCorp, Durham, NC

This year more than 800,000 tons of medical waste will be processed in the United States prior to its ultimate disposal. Waste processing will be carried out at various off-site commercial treatment facilities, or on-site at health care facilities, laboratories, or industrial operations where the waste is generated. As the waste is transported, unloaded, treated, and disposed of, workers can be exposed to a variety of potentially hazardous medical waste components and treatment residues, to include biological and nonbiological aerosols, toxic chemicals, radioactive materials, and infectious agents

Abstracts

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