

gas chromatography using a 6 ft. Chromosorb 103 glass column held isothermally at 200 degrees C. The retention time of N-methylformamide (NMF), N-methylacetamide (NMAC), and the internal standard are 8.8, 10.0, and 15.0 minutes, respectively (The N-hydroxymethyl-N-methyl metabolites are broken down to the corresponding monomethyl derivatives in the hot GC injection port.) The detection limits for NMAC and NMF are 2 and 5 mg/L, respectively. Precision ranged from 6.5 to 2.6% (n=10) for spiked urine concentrations from 15 to 150 mg/L, and recovery of 69 mg/L spiked into urines from 10 individuals averages 93.8+/-4.5%. The extraction of freeze-dried urine by a selective solvent improved detection limits by a factor of 55, reduced the presence of coextracted interferences, and prolonged the life of the chromatographic column and detector.

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EXPOSURES FROM FUEL OIL SPILL SITE CLEANUP. J. Elias, University of Manitoba, Winnipeg, Manitoba, Canada; D. Wylie, Health Sciences Centre, Winnipeg, Manitoba, Canada

Communities near clean-up sites for diesel fuel spills have expressed concerns over possible exposures during the remediation process. Community and worker exposures were measured at four remediation sites. The sites were in remote communities without industrial emissions and low traffic backgrounds. Monitoring could be carried out without background interference from these sources. Personal dosimeters were located around the sites during the cleanup to assess community exposures and were worn by high-risk workers, machine operators, and laborers. Three of the spills were on a clay base, and one was on a sand and gravel esker. Community monitoring showed low average exposure levels of benzene (0.17-50 µg/m³), toluene (0.1-40 µg/m³), ethyl benzene (0.2-161 µg/m³), xylene (0.3-2153 µg/m³) during the cleanup. Worker exposures were also low, benzene (<0.2 mg/m³), ethyl benzene (<0.2 mg/m³), toluene (<0.09-0.2 mg/m³), xylene (<0.1-0.2 mg/m³). With the relatively short exposure times, it was concluded from this study that the exposures did not present an unacceptable risk to the communities or workers. It was also concluded that exposure during fuel oil spill cleanups at other similar sites would also be unlikely to result in an unacceptable risk to any nearby community or workers.

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IS IT SAFE TO GO BACK IN? REENTRY INTO NONAGRICULTURAL BUILDINGS AFTER INSECTICIDE APPLICATION. W. Fox, Simon Fraser University, Burnaby, British Columbia, Canada

The structural pest control industry continues to rely almost exclusively on insecticides to control insect pests. Industrial hygienists are then asked by workers, "when is it safe to go back in?" to a building after application of insecticides. However, industrial hygienists have few regulations or guidelines to assist

them in making recommendations, and the scientific basis for these regulations and guidelines is often unclear.

To understand the issue of reentry into nonagricultural buildings I surveyed 81 occupational and environmental health regulatory agencies and pest control companies across Canada to determine the reentry times and practices they use and recommend to determine the basis for reentry regulations, guidelines, and practices. Next, I reviewed the literature on air and surface residues after the application of insecticides indoors and compared the residue data to currently recommended reentry times and practices.

Reentry into nonagricultural buildings is weakly regulated in Canada. Federal regulations do not require registrants of pesticides to routinely provide bystander exposure data as part of the registration package. Labels on pesticides used indoors list general reentry practices but do not provide specific reentry times or information on such practices as ventilation. Reentry times typically recommended by regulators and the pest control industry are not supported by residue data. Air and surface residues at recommended reentry times are often nearly as high as residue levels soon after application.

Based on residue and risk assessment data, a package of recommended reentry practices for health and safety personnel, pesticide applicators, and workers was prepared.

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AMBIENT AIR ALDEHYDE FLUCTUATIONS IN COASTAL GEORGIA. D. Heath, R. Greene, P. Williams, University of Georgia, Athens, GA

Aldehydes are often an airborne byproduct of industrial processes and vehicle transportation. The purpose of this 1-year study was to determine seasonal and diurnal variations in ambient outdoor aldehyde air levels in the Savannah, Georgia, area. The Savannah area presents a unique study of these fluctuations as it is located in the Atlantic coastal area and is subject to coastal freshening. Samples were collected using EPA Method TO-11 for formaldehyde, acetaldehyde, and propionaldehyde during a 24-hour period on a monthly basis for 1-year at five locations. Each 24-hour sampling duration was divided into daylight and nighttime hours. These samples were collected using DNHP cassettes and DNHP treated sorbent tubes. Four sample locations were within the urban Savannah area, and one background field control sample was collected approximately 40 miles south of Savannah in an area approximately 30 miles from any industrial sites on a coastal bay. Results found that aldehyde levels were higher during the day than at night, seasonally affected, and depended on the direction of wind flow. The 24-hour levels of formaldehyde, acetaldehyde, and propionaldehyde ranged from values of 0.2-5.1 ppb, 0.7-4.2 ppb, and 0.1-3.7 ppb, respectively, with average values of 1.8 ppb formaldehyde, 1.9 ppb acetaldehyde, and 0.07 ppb propionaldehyde. In the study there was little difference in ambient aldehyde concentrations from urban to rural areas.

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BIOAEROSOL, PARTICULATE, QUARTZ, HYDROGEN SULFIDE, AND VOLATILE ORGANIC COMPOUNDS CONCENTRATIONS ASSOCIATED WITH A LANDSLIDE AT A MUNICIPAL WASTE LANDFILL. D. Almaguer, K. Martinez, NIOSH, Cincinnati, OH

The National Institute for Occupational Safety and Health (NIOSH) received a request to assess exposures at a municipal waste landfill where a slope failure exposed approximately 22 acres of garbage. Samples were collected at three on-site locations and three off-site perimeter locations to assess general area airborne concentrations of culturable microorganisms (i.e., fungi, total bacteria, and enteric bacteria), fungal spores, and endotoxins; as well as particulates, hydrogen sulfide (H₂S), and volatile organic compounds (VOCs). The results of sampling for culturable enteric bacteria are indicative of possible microbiological dissemination from the working face of the landfill to perimeter areas. While the air sample results for fungal spore counts revealed no uniquely distinguishing findings, the concentrations detected in the landfill compactor operator's cab were consistently higher than all other sample concentrations. Finally, the air sampling results for endotoxins in the compactor cab were marginally above those from all other sample locations. The absence of definitive exposure criteria precludes the ability to assess the risks of such bioaerosol exposures. However, the airborne concentrations detected at this landfill are consistent with previous bioaerosol studies of municipal landfills reported in the literature.

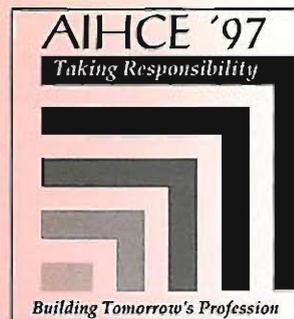
Levels of particulates, H₂S, and VOCs at on-site and peripheral zone locations did not exceed the current occupational exposure criteria. However, the presence of quartz in total particulate samples collected in the landfill compactor operator's cab suggests the potential for employee exposures to respirable quartz, although quartz was not detected in side-by-side respirable particulate samples. This finding is consistent with the previous reports in the literature which indicate that significant exposures to total dust and respirable quartz have been associated with land filling operations. The results of this study also indicate that the highest concentrations for all substances sampled (including bioaerosols) were generally found inside the landfill compactor operator's cab. This is likely the direct result of the disruptive activity of the compactor on the landfill contents. To protect the heavy equipment operators from potentially high exposures to respirable quartz and various genera of microorganisms, it was recommended that the company investigate the retrofitting of heavy equipment operator cabs with particulate air filters.

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ECAS: THE WORLDWIDE U.S. ARMY ENVIRONMENTAL COMPLIANCE ASSESSMENT SYSTEM AUDIT PROGRAM. M. Stebbing, D. Brown, U.S. Army Center for Health Promotion and Preventive Medicine, Aberdeen Proving Ground, MD

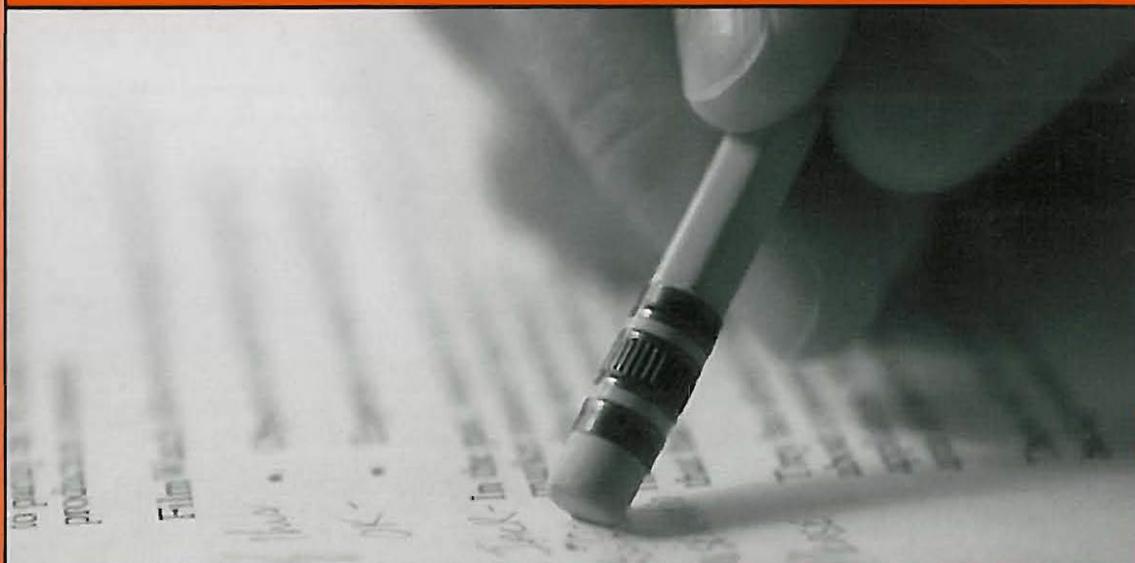
The U.S. Army uses the Environmental Compliance Assessment Systems (ECAS)

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Abstracts

*Co-sponsored by American Industrial Hygiene Association and
American Conference of Governmental Industrial Hygienists*