

cut-point of the samplers was predicted theoretically and determined experimentally using orifice diameters of the impactor ranging from 0.6 to 1.5 mm and for different sampling flow rates. An aerodynamic particle sizer was used to measure collection efficiency of the original and modified cassette. The experimental setup was validated using PSL test particles of known diameter. Evaluation of the samplers was performed using liquid (dioctyl phthalate) and dry (glass spheres) test particles at sampling flow rates ranging from 0.5 to 20.0 L/min. Our data show that the diesel particulate cassette can be modified for sampling PM-1.0 at flow rates ranging from 1.0 to 10.0 L/min when varying the size of the impactor orifices from 0.6 to 1.5 mm.

76.

A SAMPLING AND ANALYTICAL METHOD FOR DIESEL FUEL IN A DIESEL/GASOLINE ENVIRONMENT. L. Shaw, D. Verma, K. Ferguson, McMaster University, Hamilton, ON, Canada

In the petroleum industry's truck distribution and retail network, exposure to both gasoline and diesel fuel (usually C₉ - C₁₆) may occur from loading both products over the course of a workday. Therefore, an analytical method permitting determination of both airborne components from the same sample is highly desirable. Currently, a proposed TLV - TWA of 100 mg/m³ is listed in the American Conference of Governmental Industrial Hygienists (ACGIH) Notice of Intended Changes.

A gas chromatographic method, capable of separating diesel fuel from diesel and gasoline mixtures, sampled on a charcoal tube, has been developed. The method was evaluated using previously analyzed chromatograms of hydrocarbon exposure samples collected during an earlier study of petroleum truck driver exposures. The most appropriate standard for use in determining concentrations of diesel fuel in airborne samples is a bulk standard of the diesel fuel in use at the time.

All the samples from the earlier study showed airborne diesel fuel exposures below 100 mg/m³. Driver TWA samples had a mean value of 6.15 mg/m³ and ranged from 0.41 mg/m³ to 24.06 mg/m³. No TLV - STEL has been proposed for diesel fuel, but all loading and unloading task samples were below 100 mg/m³. The loading samples ranged from 0.01 mg/m³ to 65.91 mg/m³, with a mean value of 12.33 mg/m³. The unloading samples ranged from 1.00 mg/m³ to 49.48 mg/m³, with a mean value of 13.54 mg/m³. Travel samples ranged from 0.14 mg/m³ to 10.59 mg/m³, with a mean value of 1.72 mg/m³.

77.

STATISTICAL ANALYSIS OF THE BENZENE SOLUBLE FRACTION IN FIELD BLANKS USED IN NIOSH METHOD 5042. L. Olsen, S. Shulman, NIOSH, Cincinnati, OH

During the development of NIOSH Method 5042, an anomaly was noticed in the field blank data. Three of 60 field blanks had a higher than expected benzene-soluble fraction. Since this event may occur with field samples, these results were not excluded when the data were evaluated. Although these events were observed with syringe-type clarification units (A and B) and not the recommended clarification unit, the cause of this event was not determined. Statistical evaluation of all data including a three-year follow-up indicated not only was this event still occurring, but it also was occurring with the recommended clarification unit and lower than expected results were also occurring. Pooled data indicated that the % outliers were 10.3% (±8.7), 3.8% (±2.2) and 8.4% (±4.4) for the A, B and recommended clarification unit, respectively. Pooled data also indicated that the standard deviations were increased by 1.39, 1.39 and 1.75 times for the A, B and recommended clarification unit, respectively. For the recommended clarification unit, these data indicated if three or five field blanks were collected, the probability of no outliers was about 0.8 and 0.7, respectively. Likewise, the probability of one outlier was about 0.2 and 0.3, respectively. In summary, ten atypical results were observed, and the cause remains undetermined. These events have two undesirable consequences: (1) Because the average weight of the field blanks was increased or decreased, field samples were either over or under corrected, and (2) the standard deviation of the field blank weights was increased resulting in higher LOD and LOQ values. Therefore, it was recommended that as many field blanks as is reasonable (five per day) need to be collected; also, it was recommended that a monitoring program be established to track this occurrence and, if possible, to identify and eliminate the cause(s).

78.

EVALUATION OF THE NIOSH DRAFT METHOD 5525 FOR DETERMINATION OF THE TOTAL REACTIVE ISOCYANATE GROUP (TRIG) IN AUTOBODY REPAIR SHOPS. D. Bello, S. Woskie, University of Massachusetts Lowell, Lowell, MA; R. Streicher, NIOSH, Cincinnati, OH

This paper evaluates the performance of the NIOSH draft method 5525 for analysis of monomeric and TRIG aliphatic isocyanates in autobody repair shops. It was found that an optimized pH gradient enhanced noticeably the resolution and, therefore, identification of aliphatic isocyanates. Samples proved to be very stable for at least a year when stored at -13°C in the freezer, and no major stability problems were found for the MAP reagent. The detector response factor variability (CV) for selected MAP ureas was 40% in the fluorescence (FLD), 3% in the UV at 254 nm (UV₂₅₄), and 1% in the UV at 370 nm (UV₃₇₀). The mean FLD/UV₂₅₄ and UV₂₅₄/UV₃₇₀ detector response ratios of stan-

dards were 31.7 (CV = 37.8%) and 17.1 (CV = 5.0%), respectively. The FLD/UV₂₅₄ ratio in bulks varied from 0.41 to 1.97 times the HDI monomer ratio. The mean UV₂₅₄/UV₃₇₀ ratio in bulks was 16.1 (range 14.1 to 19.2, N=38). Mean (range) recovery of 92 (91.2 - 93.2)% was found for the N3300 (isocyanurate) spiked on 25-mm quartz fiber filters in the range of 0.65 to 2.06 µg NCO/mL. Mean (range) recovery for impingers was 100.7 (91.7 - 106.0)% for N3300 in the concentration range of 0.018 to 2.5 µg NCO/mL and 81.0 (76.1 - 89.1)% for IPDI in the concentration range of 0.016 to 1.87 µg NCO/mL. Analytical method precision was 3.4% and mean bias 7.4 % (range = 0 - 25%). The NIOSH draft method 5525 provides flexibility, enhanced sensitivity and specificity, powerful resolution, and very small compound-to-compound variability in the UV₂₅₄, resulting in a more reliable identification and quantification of aliphatic isocyanates.

PF 112. Air Sampling Instrument Performance

Papers 79-86

79.

A FIELD COMPARISON OF METHODS FOR ENUMERATING AIRBORNE FUNGAL BIOAEROSOLS. K. Lee, W. Black, M. Brauer, G. Stephens, J. Hsieh, K. Bartlett, University of British Columbia, Vancouver, BC, Canada

Introduction: There is no standard method for enumerating airborne fungal bioaerosols in indoor air quality investigations. A variety of sampling instruments are available with limited knowledge of their comparative sampling efficiencies in field situations. A field comparison of three commonly used instruments was conducted in a variety of public buildings (office buildings, research institutions, hospitals, temporary mobile buildings) within southern British Columbia. The Andersen N-6 (N6), Surface Air System (SAS) Super 90 and Reuter Centrifugal Sampler (RCS), in combination with two types of media, malt extract agar (MEA) and dichloran glycerol-18 agar (DG18) were compared with respect to enumeration of culturable airborne fungal propagules.

Methods: Sampling was conducted from June-September at 50 different sites. At each site, four locations were sampled (1 common area, 2 offices and 1 outdoor sample). Each location was sampled in parallel with the three instruments, collecting approximately 150 litres for each sample. Sequential duplicates were taken for each media type. Samples were incubated at room temperature and the total colony forming units were determined for each. Data analysis was performed on log-transformed concentration data.

Results: A high correlation coefficient ($r > 0.70$, $p < 0.001$) with a significant difference ($p < 0.001$) between the concentrations collected by each instrument for both media types resulted. Geometric mean concentrations

The Premier Conference for Occupational and Environmental Health
and Safety Professionals

POWERFUL PARTNERSHIPS

Leveraging the power of collaboration to expand knowledge



ABSTRACTS



American Industrial Hygiene Conference & Expo

Cosponsored by AIHA and ACGIH®

June 1–6, 2002, San Diego Convention Center, San Diego, California

NIOSH LIBRARY SYSTEM

ALICE HAMILTON LIBRARY
4676 COLUMBIA PARKWAY
CINCINNATI, OH 45226



2002 Abstract Index by Session Topic

Platform Session Topic	Abstract No.
Aerosols	157-164
Agricultural Health and Safety	1-6
Air Sampling Instrument Performance	79-86
Bioaerosols	165-173
Biological Monitoring	56-66
Community Environmental Health and Safety Issues and Social Concerns	121-126
Computer Applications in Industrial Hygiene	270-280
Construction and Equipment	218-223
Contaminant Control	140-147
Current Topics in Noise and Hearing Loss	32-38
Dermal Exposures	174-184
Ergonomics Intervention	67-72
Exposure Assessment Strategies I	39-46
Exposure Assessment Strategies II	210-217
Gas & Vapor Detection	127-132
Health Care	112-120
Indoor Environmental Quality	242-250
Industrial Hygiene General Practice	251-262
International Occupational Hygiene	232-241
Investigating Community Air Quality	203-209
Ionizing and Nonionizing Radiation Risks: Measuring the Exposure	13-18
Laboratory Health and Safety	87-94
Lead I	103-111
Lead II	263-269

Platform Session Topic	Abstract No.
Management/Leadership	224-231
Occupational Epidemiology	25-31
Occupational Ergonomics: Training and Risk Assessment	7-12
Occupational Medicine/Occupational Epidemiology	148-156
Personal Protective Clothing and Equipment	133-139
Regulating the Right Hazards Rightly	19-24
Respiratory Protection	185-195
Risk Assessment in Industry and of Terrorism's Aftermath	196-202
Testing for Air Quality in the Garage	73-78
Toxicology and Toxicology Models (BPBK and QSAR)	47-53, 53,1-55
Ventilation	95-102

Poster Sessions	Abstract No.
Poster Session 501	327-356
Poster Session 502	357-384
Poster Session 503	385-413
Poster Session 504	414-442

Case Study Sessions	Abstract No.
Case Study 301	281-292
Case Study 302	293-303
Case Study 303	304-310
Case Study 304	311-314, 317-318
Case Study 305	319-326

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 fac-

ilities. 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/m³, 10.01 ±8.84 mg/m³; endotoxin 6046±6089 EU/m³, 5457±5934 EU/m³ 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 FEV₁, 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