ing environment for over three decades. The IOM Inhalable Dust sampler developed in Britain has also been accepted as a valid method throughout the world including endorsement by the ACGIH. In this study, the two samplers were compared within a 1.1-M^3 test chamber equipped with a dynamic airflow and dust generation system. The test dust (AFRD) contained approximately 45% respirable dust (Dp < 10 mm) and 38% particles <5.5 mm by weight. A DATA RAM monitored the dust concentration in the chamber. Three different ranges of dust concentrations, i.e. low (1.0–5.0 mg/M^3), medium (5.1–10.0 mg/ M^3), and high (10.1–20.0 mg/ M^3). The two samplers were placed side by side inside the test chamber. Thirty sample pairs were collected under each dust concentration range. Sampling time for all sample pairs was 2.5 hours. The results showed a relatively consistent ratio of concentrations of inhalable dust over those of respirable dust as nearly 4.0 under all three concentration ranges (3.99 at low, 3.76 at medium, and 3.89 at high ranges). The degree of variability between samples of the same type (SD as percent of the Mean) was 28.3% for the Cyclone and 26.6% for the IOM Samplers. The Correlation Coefficient values between the Cyclone and the IOM samplers were all positive but greatly varied among the three concentration ranges (0.88 at low, 0.13 at medium, and 0.53 at high). It was concluded that the concentration of the inhalable airborne AFRD (with particle size distribution closely similar to those of most industrial mineral dusts) measured by the IOM Inhalable sampler could reliably be considered as nearly four times that of the respirable dust concentration measured by the Dorr-Oliver Cyclone.

197.

EMERGING PORTABLE X-RAY FLUORESCENCE TECHNOLOGY FOR MEASURING MULTIPLE AIRBORNE METALS: AN EVALUATION OF THE BATTERY POWERED X-RAY TUBE INSTRUMENT. N. Lawryk, NIOSH, Morgantown, WV.

Workers in the metalworking, construction, and mining industries may receive excessive inhalation exposures to metals such as chromium, nickel, and zinc, which could cause adverse health effects. Portable X-ray fluorescence spectrometry can measure airborne metals collected on filter media within minutes of collection at these worksites, thereby facilitating exposure assessment and control strategies. Recent technological improvements have led to the introduction of a new generation of portable instruments capable of measuring a broader range of elements with greater precision and lower detection limits. A portable instrument using a miniature battery-powered X-ray tube as the radiation source was evaluated along with two instruments using conventional sealed radioactive sources. Limits of detection (in μg/cm^2) for the analysis of cellulose ester filter media on a sealed source instrument with an early generation silicone detector, a sealed source instrument with a high resolution detector, and the X-ray tube instrument, respectively, were found to be 3.6, 2.9, and 2.0 for chromium; 2.0, 1.2, and 1.5 for nickel; 1.9, 1.1, and 1.0 for copper; 1.4, 2.1, and 1.0 for zinc; 3.0, 0.9, and 0.5 for arsenic; and 1.1, 0.5, and 0.6 for lead. Analyses of thin film single element standards revealed the precision of the X-ray tube instrument to be up to 50% greater than that of sealed source instruments in the 15 to 150 μg/cm^2 concentration range. Transport and maintenance of the X-ray tube instrument is simple when compared to conventional sealed radioactive source instruments and the need to periodically replace the radioactive source and dispose of the associated hazardous waste is eliminated. The portable X-ray tube XRF is a practical innovation in this series of instruments, and portable XRF spectrometry continues to show promise as a fast, reliable, and comparatively inexpensive screening tool for monitoring and controlling airborne metal exposures.

198.

A FIELD COMPARISON OF THORACIC SIZE SELECTIVE EXPOSURE ASSESSMENT TECHIQUES. L. Brown, S. Freels, L. Conroy, S. Erdal, University of Illinois-Chicago, Chicago, IL.

We measured thoracic wood dust exposure in a mid-size wood working facility in Chicago. Particle size-selective sampling was conducted using the Marple cascade impactor (MCI), PM_{10} personal exposure monitor (PEM), GK2.69 cyclone, Respicon particle sampler, and 37-mm closed-faced cassette "total" dust sampler. The goal of the study was to investigate the sampling efficiency of commercially available thoracic dust samplers under actual work conditions. All measurements were approximately 4-hour time integrated personal samples, obtained from four workers mainly performing sawing or sanding related tasks during the exposure period. We used the eight-stage cascade impactor as the reference sampler against which the collection efficiencies of other samplers were evaluated. For each sampler pair (e.g., PEM vs. MCI) ten separate measurements were obtained. A systematic sampling scheme was employed to ensure that the samples from the same pair of samplers were not obtained from the same worker and on the same day of the week. The particle size distribution for each sampling event was constructed using the MCI personal exposure data. The intersampler ratios were estimated as: 37 mm/MCI = 1.5 (0.04–4.6); GK 2.69/MCI = 1.6 (0.1–5.3); PEM/MCI = 2.6 (0.3–6.6); and Respicon-Thoracic/MCI = 1.1 (0.02–2.3). The results indicate that the intersampler ratio had significant variability, which was more pronounced for the PEM. In an earlier study, a similar finding was reported for the PEM and it was postulated that the PEM, which was originally designed for environmental exposure monitoring, might not be suitable for exposure monitoring in high dust environments encountered in occupational settings. The performance of each sampler was compared ag
tion with the
inferences at
these sample
thoracic dust
such as a wood working facility.

199.

EVALUATION OF SMALL-EVACUATED CANISTERS FOR THE COLLECTION OF LONG-TERM SAMPLES DURING A SOLVENT CLEANING OPERATION. A. Rossner, Clarkson University, Potsdam, NY.

The ability to accurately collect an air sample over an extended sampling period could be beneficial for industrial and non-industrial exposure assessments. Whether the sampling environment is a traditional production factory, an office environment, the perimeter of a hazardous waste site, or the community down wind of industrial emissions, the need to assess the airborne contamination over periods greater than 8 hours may be a prudent sampling strategy in some instances. Small-evacuated canisters (300 mL) equipped with a unique capillary flow controller were used to evaluate airborne concentrations of Stoddard solvent. The characteristics of the flow controller allowed for the very low flow rates (< 0.1 ml/min) such that the collection of an air sample for 40 hours could be accomplished. A field study was performed to evaluate the feasibility of collecting a 40-hour sample using small canisters. Each week, six canister samplers were used to monitor a cleaning operation for an entire workweek, while 30 diffusive badges, six each day, were simultaneously used to monitor the same process. No statistical difference was found between the time-weighted average for the two sampling methods, $p>0.05$. The canister samples integrate the airborne concentrations for an entire workweek and therefore peak concentrations are not explicitly observed. An examination of the peak exposures was done using a simulation model to assess if a bias is associated with the long-term sampling when peak concentrations are present. The bias was determined to be less than 10% for the conditions evaluated. In conclusion, long-term sampling with the small-evacuated canisters was found to provide comparable results and was more efficient with respect to the use of resources than sampling with the passive sorbent method.

200.

OVERCOMING HUMIDITY EFFECTS IN PHOTO-IONIZATION DETECTION. W. Yang, RAE Systems, Sunnyvale, CA.

Humidity has a significant effect on the measurement of photo-ionization detectors (PIDs). As the humidity in the sample changes from dry to wet, the signal of volatile organic compounds (VOCs) decreases. This is because the water molecules quench the UV light intensity and take part in the chemical ioniza-

AIHce 2003 ABSTRACTS

The Premier Conference for Occupational and Environmental Health and Safety Professionals

AIHce

NAVIGATING UNCHARTED TERRITORY

aih ce

American Industrial Hygiene Conference & Expo

Cosponsored by AIHA and ACGIH®

May 10–15, 2003, Dallas Convention Center, Dallas, Texas

Plan to present an abstract in Atlanta, Georgia!

Obtain a 2004 Call for Presentations,
Contact AIHA's Customer Services at
(703) 849-8888; fax (703) 207-3561

All submissions will be made on-line.
Watch the AIHA homepage for the opening announcement!

Schedule for the 2004 AIHce

October 7, 2003 . . . . . .Deadline all AIHce submissions.
October 29, 2003 . . . . . .PCC Meeting I.
November 24, 2003 . . . . . .Session Arrangers Finalize Podiums
December 3, 2003 . . . . . .PCC Meeting II.
Mid December 2003 . . . . . .Accept/reject e-mail notice to each submitter.
January 2004 . . . . . .AIHce Advance Program mailed.

Mark Your Calendar!

AIHce 2004
May 8–13
Atlanta, Georgia

For more information, contact AIHA's Customer Services at
2700 Prosperity Avenue, Suite 250, Fairfax, VA 22031
(703) 849-8888; fax (703) 207-3561
Visit the AIHce on the Internet (http://www.aiha.org/aihce.htm)

Submissions must be received electronically by October 7, 2003.