gun-to-object distance, time spent within 0.5 m of the object, posture such as stretching or bending of the sprayer, and orientation to the spray direction).

To compare sprayed amount between liquid and powder application, spray volumes were recalculated to the amount of nonvolatile compounds, taking into account the density and solid fraction of the paint. Moderate correlation was observed between amount of nonvolatile compounds sprayed and duration of exposure (r=0.4; p=0.09). Multivariate regression analysis of all exposure data revealed parameters such as amount of paint sprayed per minute, time spent within 0.5 m of the object, and orientation to the spray direction to be determinants of exposure.

Since the airless spraying technique differed substantially in exposure level and sprayed amount (per minute) from the other techniques, the influence of the exposure determinants was also examined with exclusion of the airless data. Ventilation system and posture of the sprayer also influenced exposure.

Despite the limited data set, exposure determinants of importance recognized in the present field study are reasonably in accordance with main factors identified in the proposed model to predict deposition of paint during spraying. The proposed model has been refined based on these findings.

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A MODEL FOR OCCUPATIONAL EXPOSURE TO METALWORKING FLUIDS IN SMALL-SIZED MACHINE SHOPS. K. Sieber, G. Piacitelli, NIOSH, Cincinnati, OH

Recent epidemiologic studies have reported elevated respiratory symptoms, dermatitis, and cancer among workers exposed to metalworking fluids (MWFs). In an effort to assess the extent to which workplace factors might determine occupational exposure to MWFs, aerosol measurements from 866 machinists in 79 metalworking shops representing 13 different industries were used to develop a linear regression model relating MWF concentration and workplace factors. Workplace factors included type of machining operation and industry, predominant type of MWF used in the shop and method of delivery, shop housekeeping, and number and mean age of metalworking machines in the shop.

The model also included terms for environmental factors such as outside temperature and the interaction between operation and MWF type. In order to investigate the impact of individual workplace factors on MWF concentrations, a baseline workstation was defined in the model and concentrations expected under various conditions were estimated for comparison with those expected from the baseline. A MWF concentration of 0.40 mg/m3 was estimated from the model for a baseline workstation, which was defined as a machine using straight oil (i.e., 60%-100% mineral oil without water) applied by flooding in a machine screw shop having good housekeeping.

Estimated baseline concentrations, for example, increased from 0.40 mg/m3 in shops with good housekeeping to 0 .85 mg/m3 in shops with poorer housekeeping. Estimated exposures from grinding operations decreased from 0.80 mg/m3 if straight oils were used to 0.3 mg/m3 if semi-synthetic fluids were used. Results from such comparisons may be useful in determining industry needs for further evaluation and control of MWF exposures.

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AN EXAMPLE OF A QUANTITATIVE OCCUPATIONAL/ENVIRONMENTAL EXPOSURE DATABASE: AN INFORMATION RESOURCE. J. Spencer, KNEX, Inc., Baltimore, MD

The meetings and conversations surrounding the need for building occupational exposure databases have been substantial. The Proceedings of the Conference on Occupational Exposure Databases (Applied Occupational and Environmental Hygiene, Volume 10, Number 4, 1995) and the Joint American Conference of Governmental Industrial Hygienists-American Industrial Hygiene Association Task Group for Occupational Exposure Databases are both examples of significant efforts in determining database attributes and configuration.

The purpose of the database we developed was to provide the occupational and environmental health professional an information resource for better assuring compliance, developing risk assessment and risk management strategies, and providing a resource for research. The database utilized the Internet as the infrastructure for accessibility, and the user interface was developed with Microsoft Visual Basic® and MS Access® as the relational database.

Industrial hygiene professionals select and review peer-reviewed literature, government-sponsored studies, and other publicly available information. The web-based site is dynamic, with exposure data added to the site daily. Historical and contemporary data are posted on the site, which includes many diverse workplace and ambient exposure values. All exposure data are reviewed by a certified industrial hygienist (CIH).

The database attributes were based on the recommendations made by the Joint ACGIH-AIHA Task Group and other fields considered important. Data can be searched online by key word, agent, occupational group, facility type, and standard industrial classification code. Photographs and other images of various workplace environments are linked to exposure data records for review and printing. Relevant historical and contemporary written documents can be viewed and downloaded. These documents are also linked to specific exposure records.

Such quantitative exposure data in the form of an easy-to-use database allows the industrial hygiene professional to apply more information to his or her often-complex risk management responsibilities.

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EVALUATION OF SILICOSIS IN RESPONSE TO HIGHEST TASK SILICA EXPOSURE WITH IMPUTED VALUES WHERE NO MEASUREMENTS WERE MADE. F. Grimsley, C. Rice, H. Ayer, S. Clark, P. Succop, University of Cincinnati, Cincinnati, OH; R. Rinsky, NIOSH, Cincinnati, OH

More than one million workers are exposed annually to silica in the workplace. The purpose and specific aims of this study were to investigate ways to estimate silica exposure in unsampled tasks and to evaluate the relationship between highest task silica exposure imputed and the development of silicosis. Data from the North Carolina Dusty Trades, a unique resource for exposure-response studies of the effects of silica exposure, is the basis for the study.

Three methods of imputation were used. The methods were estimating exposures based on the mean exposure at sampled commodity-specific tasks, the lower bound of the 95% confidence interval of the median of commodity-specific tasks, and maximum likelihood estimate. The three imputation methods are described and presented.

The results of this study indicate that the highest task-related silica exposure is related to the development of silicosis with an odds ratio of 2.22 and is statistically significant (p=0.001). These results can serve as a guide to changes in sampling methods and targeted control techniques that should be implemented to decrease disease in the workplace.

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WORKPLACE ENVIRONMENT AND HEALTH HAZARD EVALUATION OF POTASSIUM OCTATITANATE FIBER (PTF) PRODUCTION WORKERS. M. Taniguchi, A. Tanaka, Otsuka Chemical Co., Ltd., Osaka, Japan; K. Urata, Yamahigashi, Tokushima, Japan; K. Lee, Newark, DE

The purpose of this study was to evaluate both airborne concentrations of PTFs at various workplaces and the exposure-related potential health hazard. Airborne PTF concentrations were measured at 14 designated production sites once a year for a period of two days from 1994 to 1999. A health hazard evaluation was conducted on 27 current employees and 18 former employees. Employment period of current employees ranged from seven months to 19.1 years, the average employment being 7.6 years, while employment periods of former employees ranged from three months to 14.8 years, the average being 5.9 years.

The health hazard was evaluated by chest X-ray and lung-function tests utilizing forced spirometry and expiratory flow volume curves. The geometric mean of airborne PTF concentration ranged from 0.2 f/cc to 1.6 f/cc in 1994 and decreased to 0.10-0.14 f/cc in 1999. There were no exposure-related abnormalities in both pulmonary function and radiolographic screening in the PTF production workers.

Based on the measurements of airborne PTF concentrations in the workplace and the absence of exposure-related adverse effects in the production workers, the exposure limits of 1 f/cc PTF in the work environment appear to be appropriate to ensure protection of worker health.

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PREVALENCE RATE OF HEPATITIS C AMONG FIREFIGHTERS IN A MUNICIPAL DEPARTMENT. R. Gecosala, W. Peate, University of Arizona, Tucson, AZ

Introduction: Firefighters are exposed to a host of risk factors, including infectious disease (Hepatitis B, C, meningococcal meningitis, tuberculosis, etc.) in addition to musculoskeletal disorders, chemical hazards and physical hazards. Infectious diseases may be caused by exposure to blood and blood products as well as potentially infectious material (OPIM) such as semen, vaginal secretions, cerebrospinal, synovial, peritoneal, pericardial, and amniotic fluids.

The purpose of this study was to determine the prevalence rate of Hepatitis C among firefighters that may be due to exposure to blood and OPIM as well as other risk factors such as blood transfusion, injection drug use, sexual promiscuity, etc.

Methods: Data were obtained from a population of active firefighters ages 20 years to 65 years in a municipal fire department. A total of 472 firefighters were screened for an antibody to Hepatitis C (HCV) and Hepatitis B (HBV). For those who were positive for HCV antibody, the test was confirmed using a

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