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WHAT'S THE DIFFERENCE? COMPARING SURVEYS OF INDUSTRIAL RESPIRATOR USE. D. Groce, K. Bang, B. Doney, NIOSH, Morgantown, WV; R. Young, NIOSH, Cincinnati, OH.

This report compares the findings of several nationwide surveys of respirator use, and explores the possible reasons for differences in the findings of those surveys. The comparison was carried out in preparation for a new nationwide survey of respirator use. The primary types of survey data sought for comparison were those relating to the percentage of workers using respirators and industries where respirators are used. Four surveys of respirator use were identified for comparison. In selecting the four surveys, it was necessary to eliminate some reports and surveys due to limited scope of coverage — e.g., one industry, one state. The four surveys selected were: National Health and Nutrition Examination Survey (NHANES) III; National Occupational Exposure Survey (NOES); the Occupational Safety and Health Administration's (OSHA's) "PPE Survey" and "PPE Cost Survey." NHANES III estimated that 20.7% of all workers use respirators. The comparable estimates from the other surveys were: NOES, 2.9%; OSHA's PPE Survey, 5.1%; OSHA's PPE Cost Survey, 5.9%. Wider differences are evident when one compares the different survey data within specific industries. For example, NHANES III estimated that 40.4% of all construction workers use respirators. The comparable estimates from the other surveys were: NOES, 3.8%; OSHA's PPE Survey, 17.6%; OSHA's PPE Cost Survey, 20.2%. The differences can be attributed to a combination of the following factors: differences in date of survey; differences in strategy for respondent selection; differences in method of collecting data; differences in wording of questions. This finding is a reminder that public health investigators must be cognizant of the nature of data sources and their inherent biases and weaknesses, as well as the strengths of the data sources.

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PERFORMANCE OF N-SERIES FILTERING FACEPIECE RESPIRATORS EXPOSED TO INTERMITTENT LOADING CONDITIONS. A. Viner, 3M United Kingdom PLC, County Durham, United Kingdom; M. Jones, J. Huberty, M. Cadalbert, 3M, St. Paul, MN.

Respirator usage patterns vary widely between industries and tasks being performed. Some respirators are disposed of after a single shift or less, but others may be worn only briefly and then reused over the course of many shifts. A study was conducted to evaluate the performance of filtering facepiece respirators (made with electrostatic filter media) used in this fashion. Penetration and pressure drop of NIOSH-certified N95 respirators were recorded while adding 8 mg of sodium chloride aerosol (0.3 um MMAD) once a day over the course of three weeks. Samples were stored in a conditioning oven at 85% RH and 37°C between exposures. Penetrations increased during the loading and there was often a step-increase in penetration from one day to the next. Penetration reached a maximum of 4.5% at a loading of 80 mg. Pressure drop did not increase significantly during the test, even after loading with 100 mg of salt. This performance is significantly different from that observed during a standard 42 CFR 84 certification test, in which pressure drop increases continuously and penetration typically decreases with loading. Storage conditions of partially loaded respirators played a significant role in subsequent performance of a respirator; sample weights recorded before and after storage in the conditioning oven revealed they had absorbed water. Respirators loaded in a similar fashion with other, non-hygroscopic aerosols (e.g., silica dust) and probed with NaCl aerosol did not exhibit increasing penetration. Although intermittent exposure was found to be more damaging than continuous loading, the respirators still met the performance requirements of an N95 respirator.

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PERFORMANCE OF N-, R- AND P-SERIES RESPIRATOR FILTERS AGAINST DIESEL EXHAUST. S. Berardinelli, M. Sandy, S. Martin, Jr., E. Moyer, NIOSH/DRDS/LRB, Morgantown, WV.

The National Institute for Occupational Safety and Health (NIOSH) certifies nonpowered air-purifying particulate respirator filters according to 42 CFR 84. Air-purifying respirator filters are categorized as N-, R- or P- depending on their resistance to degradation. N-series filters are not resistant to oil, and R- and P-series filters are recommended for use in all work environments. There are three levels of efficiency within each filter series, 95, 99, and 100 (99.97) percent. Previous NIOSH studies have demonstrated filter media efficiency reduction resulting from constant and intermittent aerosol exposures in the laboratory. This study is part of a larger study to test for the degradation of respirator filters in the field. N-, R- and P-series filters were exposed to varying concentrations of diesel exhaust in an underground mine. Testing was conducted at the NIOSH Lake Lynn Laboratory experimental mine facility near Fairchance, PA. The ventilation characteristics of the mine were altered to provide suitable exposure. The source was a diesel-powered portable welder, which would have applications in both the mining and construction industries. Filters were tested in quadruplicate at a flowrate of approximately 50 L/min. Filter load was determined gravimetrically with parallel sampling conducted during diesel exposures. All filters were loaded at varying concentrations up to about 50 mg of diesel particulate matter and then tested for penetration using 42 CFR 84 certification test aerosols. In all of the filters tested, penetration values increased from that of the controls, but especially the N-series filters with electrostatic media which would not met the penetration criteria of 42 CFR 84. These data demonstrate that a diesel-powered welder can significantly affect the filter efficiency of N-series respirators.

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BIOMONITORING OF THE INFLAMMATION MEDIATOR, LEUKOTRIENE E4, IN DIESEL EXPOSED WORKERS. J. Burch, Dept. Environmental Health, Colorado State University, Fort Collins, CO; P. Bigelow, K. Bakjaji, Colorado State University, Fort Collins, CO.

Concern over adverse health outcomes in workers exposed to diesel exhaust has led to an intensified effort to develop suitable surveillance methods. Paramount in this effort is the development of biomonitoring approaches to identify acute reactions and possibly early indicators of chronic lung dysfunction, including cancer. Pulmonary inflammation is likely to play a key role in the generation of lung disease in diesel exposed workers. This study tested the hypothesis that urinary excretion of the inflammation mediator, leukotriene E4, was increased among transportation workers with elevated exposure to diesel exhaust. Study participants were employed as bus mechanics, conductors, drivers and administrative (comparison) workers in Damascus, Syria and Fort Collins, Colorado. Personal full-shift monitoring for diesel particulate exposure was conducted among each of the 41 participants using NIOSH method 5040. Subjects also provided concurrent post-shift and overnight (nocturnal) urine samples for analysis of LTE4 via an enzyme linked immunosorbent assay. Overall, exposures were highest among workers who spent their day in the Damascus bus depot. Several subjects had diesel particulate exposures exceeding the proposed TLV of 0.05 mg/m3. Personal elemental carbon exposures were associated with increased overnight LTE4 excretion and nocturnal creatinine-adjusted LTE4 concentrations, but not with post-work shift LTE4 levels. The results suggest that diesel exposures induce a pulmonary inflammation response that can be assessed by determining urinary LTE4 concentrations. This work was supported by a grant from the Colorado State University, College of Veterinary Medicine and Biomedical Sciences.

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QUANTITATIVE DETERMINATION OF TOTAL ALIPHATIC ISOCYANATES ON SKIN AND SURFACES USING THE MAP REAGENT. F. Youngs, D. Bello, S. Woskie, University of Massachusetts — Lowell, Lowell, MA; R. Streicher, NIOSH, Cincinnati, OH; Y. Liu, Yale University, New Haven, CT.

There is increasing interest in the effects of dermal exposure to isocyanates. One of the limitations with determining dermal exposures has been the lack of a suitable analytical method for the quantification of isocyanates sampled from skin and work surfaces. Sample preparation and analysis were performed according to NIOSH draft Method 5525 for total aliphatic isocyanates in air with some modifications. The pads, impregnated with polypropylene glycol, were obtained from a commercial source. Once a surface or area of skin has been wiped, the pad is placed in the field in a solution of 1-(9-anthracenylmethyl)piperazine (MAP) in methylene chloride for immediate extraction and reaction. Samples are subsequently acetylated to react with excess MAP reagent then processed through a 0.45um filter and a reversed-phase, solid phase extraction (SPE) cartridge. The SPE cartridge significantly reduces interferences from surface and skin wipe samples. The compounds of interest are eluted from the SPE cartridge with acetonitrile and methanol. The analytical method LOD has been conservatively estimated to be 10 ng for both HDI and IPDI. Laboratory spiking of pads was performed to determine extraction efficiency. Pads were spiked with oligomers of HDI isocyanurate (n=24) and IPDI (n=21) at seven different concentrations, ranging from 0.067 to 3.1 and 0.041 to 1.1 ug NCO, respectively. Recoveries for HDI and IPDI were found to be concentration dependent. Correction factors for the recovery of HDI and IPDI were determined from the regression equations of spiked versus recovered oligomer. The HDI oligomer showed an average recovery of 79% while the IPDI oligomer showed an average recovery of 66%. The skin and surface wipe method described

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ABSTRACTS