

minute. Finally, examples of measurement results made in real-life (training) conditions will be presented and discussed.

Keywords: A-analytical methods, A-sampling methods, A-industrial hygiene, B-mixtures

We-O-C1-02

Evaluation of the Use of Environmental Surrogates to Estimate Exposure to Diesel Particulate Matter (Total Carbon) in an Underground Metal Mine

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Abstract: Elevated exposure to diesel particulate matter (DPM) has been linked to adverse health outcomes including respiratory irritation, cardiovascular disease, immune dysfunction, and lung cancer. Underground miners experience amongst the highest exposures to DPM of any occupation. The goal of this research is to use realtime and time-integrated sampling methods to evaluate the use of environmental surrogates to estimate exposure to DPM-Total Carbon (DPM-TC) in an underground metal mine. Using miners placed into differential exposure categories and results of environmental monitoring, correlations between DPM-TC measurements and realtime measurements of diesel exhaust (including particle mass and count concentrations, NO₂, and CO) were determined. The resulting data provides important information related to using other environmental byproducts of diesel exhaust to serve as surrogates to estimate DPM-TC in an underground mining environment. Analyses of results from environmental and personal monitoring suggest a fair correlation between realtime measurements of particle mass concentration and NO₂ and measurements of DPM-TC (R² values of 0.75 and 0.76, respectively). With respect to personal measurements, concentration results of DPM-TC generally followed a miner's low, medium, or high exposure category and ranged from 21 µg/m³ to 132 µg/m³ with an average of 55 µg/m³ (SD = 22 µg/m³). Study results suggest there is a fair correlation between realtime measurements of particle mass concentration and NO₂ and time integrated measurements of DPM-TC. Personal exposure measurements of DPM-TC were below MSHA compliance thresholds validating the use of appropriate ventilation and diesel powered equipment controls. Large OC fractions in DPM-TC samples need to be further explained and appear to indicate the presence of OC interferences in the ambient air or the use of a B70 diesel fuel blend to power vehicles and ore extraction-related equipment.

Keywords: A-exposure factors, A-industrial hygiene, A-sampling methods, B-particulate matter

We-O-C1-03

Assessment of PAH Body Burden and Associated Health Risk Analysis among Occupational Workers Exposed to Petrochemicals

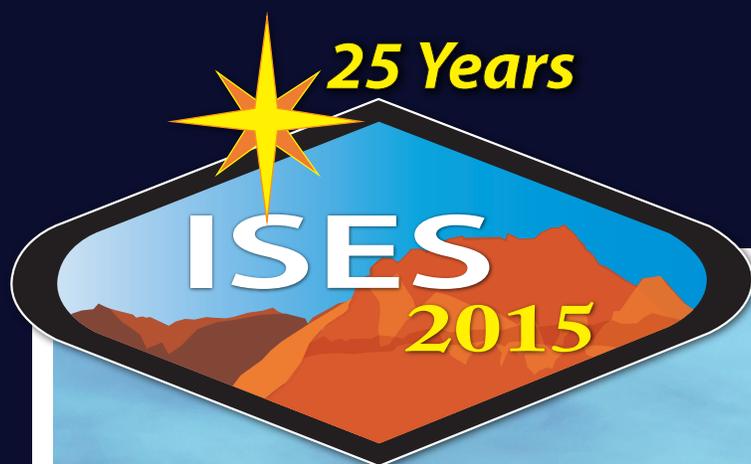
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Abstract: Occupational exposure assessment to polycyclic aromatic hydrocarbons (PAHs) is neglected issue in Pakistan. Although petrol filling workers represent an occupational group that have been directly exposed to PAHs but their biomonitoring study has never been conducted. The current investigation aimed to determine serum naphthalene and pyrene levels as biomarker of PAH exposure among 87 petrol filling workers and associated health effects related to life time occupational exposure. The health risks were evaluated by the help of questionnaire. Self-reported health status of each worker was categorized as: physical disorders and neurasthenic symptoms. Blood samples were collected for analysis of naphthalene and pyrene concentration by HPLC. The results showed that median concentration of blood naphthalene was 98.3 µg L⁻¹ which had significant correlation with cigarette smoking ($r=0.43$; $P<0.001$). There was fairly high significant effect of work duration per week on serum PAHs levels. Workers exposed to 10 hour per day or more had significantly high prevalence of physical disorders (OR=3.16; 95% CI = 1.23-8.11). Neurasthenic symptoms were found in 56% of the subjects and were associated with years of involvement in job. Eight years or more of continuous work as petrol filling worker attributed substantial development of neurasthenic effects (OR=2.68; 95% CI = 1.03-6.90). The study concludes that serum naphthalene and pyrene levels can be used as biomarkers for PAH exposure. The associated disturbances in physical and neurological behavior observed among petrol filling workers further prove that overall health and functional capacity of this occupational group was significantly important to be considered. Our findings contribute in improving occupational health by using human biomonitoring as an instrument for naphthalene exposure.

Keywords: A-biomarkers, A-biomonitoring, A-exposure factors, A-risk assessment, D-occupational

Final Abstract Book

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