few very limited number of studies have been conducted on the role of mycotoxins on human health in indoor air, the role of mycotoxins remains controversial. Here we report mycotoxin analytical results from drywall samples colonized with visible mold. Microscopic analyses showed that the drywall samples were colonized with Stachybotrys. The samples were extracted with methanol and subject to HPLC separation coupled to a diode array and/or fluorescent detector, depending on the analyte. The data were then analyzed based on retention times and spectral analysis compared to standards and a library database of 72 mycotoxins or related secondary metabolites. These include trichothecenes (satratoxins, roridins, verucarins, and deoxynivalenol), atranones, memnobotrins, ochratoxins, gliotoxin griseofulvins, sterigmatocystin, and zearalenone. One bulk sample had 8.5 mg/sq. cm satratoxin H, 3.5 mg/sq. cm roridin E, and detectable levels of atranones, memnobotrins, mycotins, stachybotrylactone, and stacybotryamide. Another sample had 1.2 mg/sq. cm sterigmatocystin, indicating the presence of Aspergillus along with the Stachybotrys metabolites, atranone and mytoxin C. Other samples also contained metabolites indicative of Stachybotrys and Memnoniella. Airborne spore levels were determined simultaneously, allowing rough estimations of potential exposures of the occupants to mycotoxins.

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MICRO-VAC DUST CARPET SAMPLE FOR FUNGI. J. Tiffany, H. Bader, Y. Li, Tiffany-Bader Environmental, Inc., Bedminster, NJ.

Over 500 micro-vac dust carpet samples were collected from a 500,000 ft2 executive headquarters' office building. The sampling strategy was to compare (1) perimeter office space to interior offices, and (2) carpet in front of perimeter fan coil units to carpet by desks within individual perimeter offices. The sample results linked elevated mold levels in the carpet dust to proximity to fan coil units. Inspections of these areas showed leaking pan drains to be directly linked to the findings of active fungal growth. A building-wide maintenance program was instituted which included on-going proactive fan coil unit inspections, the removal of carpet within 4 inches of the fan coil units, and the purchase of HEPA-filtered vacuums for the cleaning crew. Follow-up testing yielded significantly lower levels of fungi. The paper will discuss what constitutes "elevated" readings.

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BACTERIA IN INDOOR ENVIRONMENTAL QUALITY (IEQ) INVESTIGATIONS: ARE THEY RELEVANT? A. Havics, pH2 Environmental, Inc., Indianapolis, IN; B. Wallace, Alliance Environmental, Inc., Indianapolis, IN.

Much has been presented and discussed on the sampling and significance of fungal bioaerosols, whereas their bacterial counterparts have been left relatively unaddressed with a few notable exceptions such as Legionella and gram-negative bacteria (as a group). The evidence from a set of four indoor environmental quality (IEQ) investigations where bacteria were suspected of being an agent of concern will be reviewed. The outcomes of these studies varied with respect to the exposed "population," the human health relevance and subsequent environmental health significance, but collectively are sufficient to lay some groundwork in comparing the value of sampling for bacteria to the value of sampling for fungi during field evaluations of IEQ.

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CADMIUM OVEREXPOSURES IN 3 BRONZE FOUNDRIES CAUSED BY RESIDUAL TRACE CADMIUM LEVELS IN ZINC ALLOYS. T. Morris, Ohio BWC, Cincinnati, OH.

Trace level materials are typically ignored as an exposure hazard, e.g., OSHA's 1% or 0.1% reporting exemptions in the Hazard Communication Standard. Trace materials may include an added component, an impurity or a by-product. They typically are not listed on an MSDS or other documentation such as QC reports or metal alloy designations (ASTM, etc.). Cadmium (up to 0.8% by weight) is found in zinc ore and is recovered as a by-product of zinc refining. Residual cadmium in finished zinc alloys can range from about 0.0004% to 0.01% by weight. We report cadmium overexposures in three bronze foundries as a consequence of this trace cadmium content. Cadmium as low as 0.0004% resulted in exposures that exceeded OSHA's 1992 AL and PEL. Exposures were variable, especially in a small foundry (fewer than 10 employees) where employees perform multiple duties. In general, pourers had the highest exposures (8-hour TWA = 7 µg/m3) followed by furnace operators (1.6 µg/m3) and then finishing (cutoff, grinders) workers (1.2 µg/m3). Task-based samples were also taken showing significant exposures for certain tasks, in particular zinc addition to the pouring ladle. As expected, samples taken in the plume emitted after zinc addition (a pound or less) showed extremely high cadmium levels (up to 2100 µg/m3). We have shown that trace cadmium in zinc alloys can result in significant overexposures. Cadmium exposures should always be assessed when pure zinc alloys are processed or used and should be considered when zinc-containing alloys (bronzes) or other zinc-containing materials (zinc oxide) are used. It is imperative that the trace composition of materials be considered when planning an exposure assessment. This usually requires contacting the manufacturer for additional information and may trigger trade secret concerns.

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EVALUATION OF EXISTING TECHNOLOGIES FOR THE CONTROL OF EXPOSURES TO HEXAVALENT CHROMIUM-CONTAINING MISTS AND DUSTS. L. Blade, M. E. Wallace, A. Khan, J. L. Topmiller, NIOSH, Cincinnati, OH; M. Story Yencken, J. D. Catalano, Battelle Centers for Public Health Research and Evaluation, Seattle, WA.

The National Institute for Occupational Safety and Health (NIOSH) conducted 20 field surveys in selected industries, to characterize workers' exposures to hexavalent chromium-containing airborne particulate and evaluate existing technologies for controlling these exposures. This substance is a respiratory irritant, and chronic inhalation may cause lung cancer. Primary evaluation methods included collection of full-shift, personal breathing-zone (PBZ) air samples for hexavalent chromium (Cr[VI]), measurement of ventilation system parameters including face velocities, and recording of descriptive information about processes and work practices. This presentation summarizes the findings of selected field surveys. One field survey was conducted in a chromium plating facility. PBZ exposures as high as 16 micrograms of Cr(VI) per cubic meter of air (µg/m3) were measured, exceeding the 1 µg/m3 NIOSH recommended exposure limit (REL) despite several engineering controls on the plating tanks. A field survey also was conducted in a painting and coating facility which utilizes Cr(VI)-containing products. Some of the painters' exposures exceeded the REL, ranging up to 55 µg/m3, but the lack of full exhaust enclosures at some painting workstations limits exhaust-system effectiveness. Another survey was conducted at a printing ink manufacturer, where some exposures in excess of the REL, as high as 3.2 µg/m3, were measured. A variety of correctable deficiencies in exhaust ventilation and work practices were documented. At a chromium sulfate manufacturer, one exposure (1.4 µg/m3) slightly above the REL was measured. Other operations evaluated include welding, cutting, printing, foundries, and the manufacture of refractory brick, colored glass, and Portland cement. Based on results of these surveys, NIOSH researchers have concluded that, in some operations evaluated, hexavalent chromium exposures less than the NIOSH REL are achievable with good exposure-control measures, while in others, it is unclear if exposures below this level are achievable with existing technology.

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MODIFYING THE WORK PRACTICES OF ELECTRIC ARC FURNACE TENDERS TO CONTROL THEIR LEAD EXPOSURE IN A STEEL PLANT. J. Kominsky, Environmental Quality Management, Inc., Cincinnati, OH.

Understanding the behavior of an emission source, work practices of the worker, and their relationships to each other can yield an effective solution for reducing worker exposures from a source. Work practice controls evaluated for implementation at a steel plant were considered to be an effective method of minimizing the lead exposures of furnace tenders to below the 12-hour work shift adjusted OSHA permissible exposure limit (PEL). These work practice controls were in addition to the engineering controls the steel plant was implementing to improve particulate evacuation from the twin-shell 200-ton electric arc furnace (EAF). An observational survey of EAF tenders was conducted at the plant to identify specific work practices that had the highest potential exposure to airborne lead. Several such work practices were identified that occurred up to 11 times per shift depending on the number of heats. Air monitoring was conducted to evaluate the exposures from these work practices. Modification of these work practices through worker awareness training reduced the personal breathing zone lead exposures of the furnace tenders to < 8 µg/m3, 12-hr TWA. Repeat exposure monitoring verified the effectiveness of the modified work practices. Involvement of employees in the observational survey, monitoring, and worker awareness training created an effective exposure control program.

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REAL-TIME PARTICULATE MATTER AND SULFUR DIOXIDE EXPOSURES AND EXPOSURE DETERMINANTS FOR PRIMARY ALUMINUM PRODUCTION POTROOM WORKERS. M. Cohen, WA State Dept. of Labor & Industries, Olympia, WA; N. Seixas, P. Moore, J. Lymp, J. Kaufman, University of Washington, Seattle, WA.

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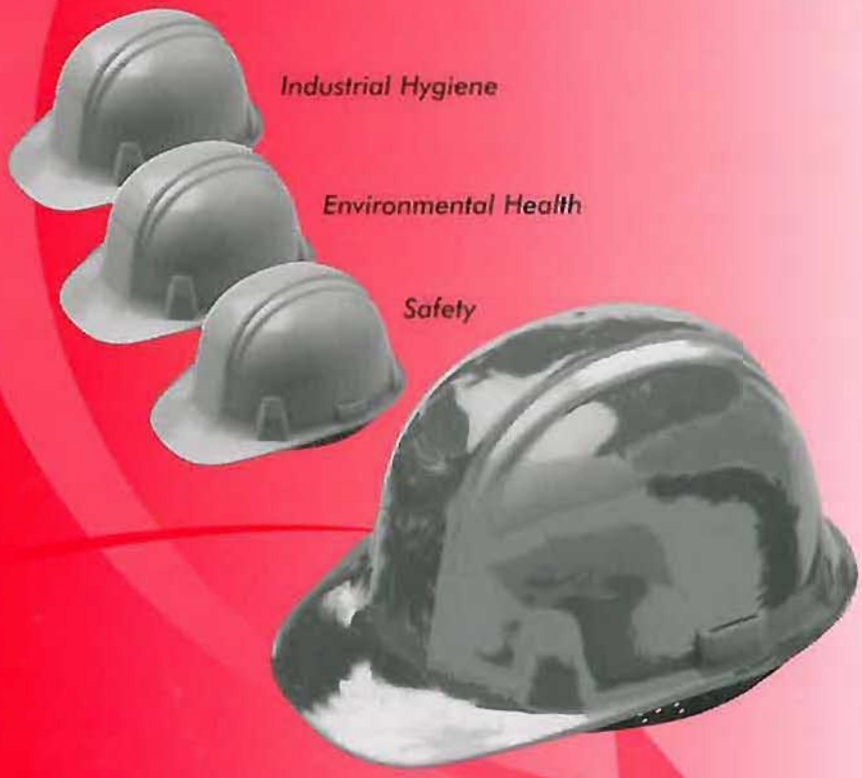

ABSTRACTS