dissolution rates of copper and beryllium from a copper oxide-beryllium oxide (CuO/BeO) fume aerosol material and the dissolution rate of beryllium from a finished product BeO powder. Observed dissolution rates were normalized to values of specific surface area (SSA) to calculate a chemical dissolution rate constant (k) for each material. Dissolution of beryllium from BeO powder was biphasic (9% of total dissolved was in the initial rapid phase and the remaining 91% was in the slower long-term phase); k_{Be} values were 8×10^{-7} g/(cm^2·day) (initial phase) and 7×10^{-9} g/(cm^2·day) (long-term phase). Dissolution of copper from the fume aerosol material was rapid, consisting of a single phase (100% dissolved in 4.5 days); $k_{Cu} = 8 \times 10^{-7}$ g/(cm^2·day). Complete dissolution of copper from the fume aerosol exposed inclusions of BeO, which exhibited biphasic dissolution behavior. The measured value of SSA for the fume differed from the SSA that governed beryllium dissolution, which precludes determination of k_{Be}. The BeO inclusions would have higher SSA than measured for the total particle sample and beryllium would therefore dissolve at a proportionally higher rate. In summary, a BeO-containing fume aerosol generated during the manufacture of copper-beryllium alloy has bioavailability properties similar to single-constituent BeO powder, which may help to explain the risk of beryllium sensitization and CBD for workers who manufacture copper-beryllium alloys.

240.

CITING A LABORATORY FOR THE USE OF TRANSMISSIBLE SPONGIFORM ENCEPHALOPATHY (TSE) AGENTS. M. Maslowski, Public Health Agency of Canada, Winnipeg, MB, Canada; J. Thom, University of British Columbia, Vancover, BC, Canada.

Laboratories traditionally did not have a primary Transmissible Spongiform Encephalopathy (TSE) focus. However, with the international increase of Bovine Spongiform Encephalopathy and its devastating economic and social impacts, containment laboratories specific to TSE handling are on the rise. The Canadian Science Center for Human and Animal Health (CSCHAH) is currently the world's only high-containment facility (containment levels 3 and 4) dealing with both human and animal pathogens. The CSCHAH houses the Canadian Food Inspection Agency's National Center for Foreign Animal Disease and the Public Health Agency of Canada's National Microbiology Laboratory. Located in Winnipeg, Manitoba, Canada, the facility is approximately 29,200 square meters in gross area. Because of both the potential and perceived risks associated with TSE handling, a risk methodology process was used to cite a new, dedicated TSE laboratory within the existing CSCHAH. The following paper presents elements by which advancements in citing a TSE laboratory are being made. Learn the whys of establishing a laboratory specific to TSE agents. Learn the hows as the poster highlights the citing process, laboratory design, and operational practices. Program templates such as process maps, policy, and risk assessments will be shared with participants as additional handouts.

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241.

EVALUATION OF PROPOSED VENTILATION EQUATIONS FOR EXOTHERMIC PROCESS CONTROL. J. McKernan, CDC/NIOSH, Cincinnati, OH.

Our understanding of heat transfer and meteorological theory, and their applications for engineering control design, have evolved since Hemeon first published his research on heated process control in 1955. These refined theories were reviewed to develop a newly proposed equation to estimate buoyant plume volumetric flow. To determine which equations were most accurate, the proposed, ACGIH, and Hemeon's equations were compared to direct measurements of buoyant flow parameters from laboratory experiments. Two hundred laboratory data points were collected at various excess temperature and height combinations using a hot-wire anemometer and a model exothermic process. The comparison of the three equations to experimental results was conducted by using multiple one sample T-tests for differences between the experimental data and solutions to each of the three equations. Statistical comparisons (difference of means, standard deviation and p values) of the volumetric flow from the experimental results and solutions from the three equations indicated that the ACGIH equation provided results that slightly overestimated the laboratory volumetric flow (ACGIH: 0.02, 0.30, 0.65). The proposed equation slightly underestimated the laboratory volumetric flow; however, it provided better overall results than Hemeon's equation. Examining the p values, it can be seen that the proposed and the Hemeon equations provided results that were different from the experimental data (proposed: -0.06, 0.16, 0.03; Hemeon: 0.13, 0.35, 0.02). Overall, the proposed equation provides a slight underestimation of volumetric flow; however, this estimate has considerably less variability than either of the currently accepted equations. Benefits of the proposed equation are its ease of application, basis in well-developed heat transfer and meteorological theories, and lack of subjective safety factors that are built into the other currently accepted equations.

242.

DESIGN OF A LOCAL EXHAUST VENTILATION SYSTEM FOR CONCRETE DRILLING AND CHIPPING. S. Shepherd, University of Massachusetts-Lowell, Lowell, MA.

Silica exposures in construction remain a top priority due to the serious consequences of exposure and the large and increasing volume of concrete construction. Environmental and occupational health professionals are seeking control solutions to this problem beyond the respiratory protection worn by workers. Contractors are also seeking to reduce the expense of clean up and the public image of a very dusty workplace. More contractors are willing to try local exhaust ventilation systems on concrete-cutting tools and, therefore, the need to understand these systems from a design standpoint is more important than ever. The LEV systems evaluated in this study consisted of two different portable vacuum cleaners and three different off-the-shelf cowls that may be attached to hammer drills and chippers. Field evaluations were held under controlled conditions at the New England Laborers Training Center. During concrete drilling, these systems reduced exposure to respirable concrete dust by an average of 85%. A minimum flow of 18 cfm was found to remove concrete dust to acceptable levels. Flow was measured by using a pitot tube and digital manometer in the field during the trials. Four different tools were evaluated ranging from a 7/8-inch SDS-plus rotary hammer to a 3/4-inch hex demo hammer as well as a pneumatic chipping gun. Consistent reductions were not achieved for chipping, but results indicate that with modifications, dust reduction is possible. Lab experiments were performed measuring velocity and static pressure in various configurations. Thus, the friction losses in typical corrugated hoses ($f = 0.03$) and entry losses through various cowls were calculated. Using this information, industrial hygienists working in construction can make design recommendations for the optimal portable dust removal systems for their application.

243.

SAFETY IMPROVEMENT OF DUST COLLECTION SYSTEM IN WOODWORKING FACILITIES. L. Menard, CSST, Montreal, PQ, Canada.

Wood dust fires and explosions caused injuries and fatalities among workers involved in Quebec province woodworking facilities. Following those incidents, the Prevention Inspection Department of the Quebec Health and Safety Commission decided to initiate a wide inspection intervention program among all facilities involved in woodworking processes. Different tools were developed for our inspector formation taking the form of an inspection worksheet referring to main rules of NFPA standard: *NFPA 664 Standard for the Prevention of Fire and Explosion in Wood Processing and Woodworking Facilities.* A technical guide was also developed for dust collecting and dust treatment equipment designers and suppliers. The formation program was dispensed to 120 inspectors, and information meetings were organized for more than 60 equipment suppliers and designers. Inspection interventions took place in 143 different facilities and necessitated 268 visits. Noncompliance was associated with absence or deficiency in design and installation of deflagration venting in 73% of cases, absence of positive shut off trap on dirty air stream in 65% of cases, and front flame diverter on recirculated clean air stream in 69% of cases. Other safety devices, such as rotary valve on dust collector waste outlet to stop deflagration progression to bin or silo and spark detection and suppression system necessary to protect dust recovery systems

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