INFILTRATION AT THE TAR CREEK SUPERFUND SITE. M. Phillips, R. Graff, R. Lynch, D. Johnson, University of Oklahoma, Oklahoma City, OK.

Tar Creek in northeastern Oklahoma is a former lead mining area with serious environmental contamination from remaining piles of mining waste. Lead contamination is known to infiltrate homes in the area. Indoor exposure is important because people spend most of their time indoors. This study sought to identify factors influencing particle infiltration into residences from outdoors. Indoor and outdoor total particle concentrations and lead concentrations, normalized leakage of the home, and HVAC type were determined in 45 homes. Particle concentrations and lead concentrations were found to be generally higher indoors than outdoors. Infiltration factors (indoor concentration divided by outdoor concentration) ranged from 0.074–11 for lead and from 0.073–35 for total particles. Indoor and outdoor lead concentrations were significantly correlated ($r = 0.54$). Indoor and outdoor total particle concentrations were not correlated ($r = 0.07$). Homes without central HVAC systems were found to be leakier than homes with central air. The normalized leakage and the HVAC type were not correlated with either the total particle infiltration factor or the lead infiltration factor. The fact that most infiltration factors for lead were greater than 1.0 indicated that there were other sources of indoor lead contamination besides infiltration from the outdoor air, such as tracking of dust from outdoors followed by resuspension due to indoor activities. Smoking and cooking were potential sources of total particulates inside the home. The presence of other indoor sources of total particulates and of lead could have masked the effects of HVAC types and/or normalized leakage on infiltration.

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LEAD BIOMONITORING ON DOGS AS SENTINELS FOR RISK ENVIRONMENT ASSESSMENT. N. Manay, A. Cousillas, L. Pereira, C. Alvarez, Faculty of Chemistry–University, Montevideo, Uruguay; A. Caorsi, Faculty of Veterinary–University, Montevideo, Uruguay.

Withdrawn

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HUD LEAD PROGRAM UPDATE. W. Friedman, U.S. HUD, Washington, DC.

Update on HUD's lead program and implications for industrial hygiene practice. Topics include the content of the second edition of the *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing* ("HUD Guidelines"), which is cited as a "documented methodology" for lead-based paint inspections and risk assessments; the strategy and content of the technical amendment to the Lead Safe Housing Rule for pre-1978 housing that is federally-assisted or federally-owned and being disposed of; content of revision to the interpretive guidance for that Rule associated with the amendment; expansion of HUD's enforcement efforts for the Lead Disclosure Rule, in partnership with EPA, DOJ, and local health and housing agencies; expansion of activity HUD's "Big Buy" program for lead inspections and risk assessments in multifamily residential properties receiving "project-based" assistance; initiation of lead evaluations and control activities regarding the sale of single-family housing that defaulted on Federal Housing Administration mortgages and have reverted to temporary HUD ownership; and HUD's new Safe and Healthy Homes Initiative which fosters collaboration with CDC and EPA, focusing on promoting local partnerships among housing, community development, health, and environmental agencies, and private-sector stakeholders, to address lead and additional housing-related health and safety hazards within a community.

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HOUSING SURVEYS AND CHILDHOOD LEAD POISONING: COMPARISON OF RETROSPECTIVE AND PROJECTED TRENDS BETWEEN 1990 AND 2009. D. Jacobs, U.S. HUD, Washington, DC.

A new method of following and forecasting trends in childhood lead poisoning has been validated using surveillance data from The American Housing Survey, the Residential Energy Consumption Survey, the National Survey of Lead and Allergens in Housing, and the National Health and Nutrition Examination Survey. The previously unexplained decline in childhood lead poisoning during the 1990s can be described by data on housing demolition, substantial housing rehabilitation, and residential lead hazard control. The National Health and Nutrition Examination Survey reported that the number of children with blood lead levels above 10 ug/dL in the years 1991–1994 was 890,000 children ages one through six years. The NHANES estimates for the years 1999–2000 show that this had declined to an estimated 434,000 children. At the same time, the National Survey of Lead and Allergens in Housing showed the number of housing units with lead-based paint declined from 64 million in 1990 to 38 million in 2000. Both the child and housing estimates were accurately forecast by exposure models based on the three housing databases above. Using more recent data on housing demolition, rehabilitation, and lead hazard control, it is possible to forecast an additional decline in the number of children with blood lead concentrations > 10 ug/dL. The model shows that the number of children with blood lead concentrations > 10 ug/dL in 2005 will be approximately 150,000 and will decline further to approximately 50,000 in 2009. Methodologies for combining housing and health data hold promise for other diseases related to housing conditions.

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CHILD LEAD ISSUES IN NON-REGULATED BUILDINGS. V. Belfit, U.S. Army CHPPM, Bel Air, MD.

The U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) is working with Department of Defense (DOD) components to address the issue of high levels of lead in DOD facilities occupied by children on a regular basis. USACHPPM has also proposed lead surface wipe decontamination standards for these facilities, in the absence of existing federal standards. Lead contamination can create a lead hazard environment for children occupying these buildings on a regular basis. Sources of lead exposure in these facilities include lead contaminated dust generated from lead-based paint, indoor firing ranges, weapons cleaning/maintenance, lead acid battery maintenance, and recycling and vehicle operations. Lead levels from samples collected significantly exceeded the Environmental Protection Agency (EPA) lead standards for young children in child-occupied facilities. EPA standards were developed specifically for children under the age of six spending at least 60 hours per year in pre-1978 facilities. The facilities surveyed are not designated childcare facilities and most do not meet the EPA definition of a child-occupied facility's minimum time requirement for child use. However, USACHPPM believes the facilities are still potentially hazardous for children. In a recent installation survey to identify all DOD component facilities used by children, 11% of respondents reported regular use by children six years or less, and close to 50% of respondents reported regular use by children 17 or younger. Facility use ranged from infrequent occupancy such as holiday and community events to daily occupancy including after school daycare and sports practice. This presentation will discuss USACHPPM proposed levels of concern and action levels for decontamination of these facilities. Recommended interim actions will also be discussed, and will be based on the age of facilities, age of children, lead exposure sources, and accessibility of sources, until facilities can be further evaluated and corrective actions implemented.

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OBJECTIVE COMPARISON OF WIPE SAMPLING MEDIA FOR DETERMINING LEAD ON HANDS. M. Boeniger, NIOSH/CDC, Cincinnati, OH.

Hand contamination by toxic compounds such as lead presents a potentially significant health hazard to workers if the contamination is transferred to the mouth by food, smoking, etc. One method to sample the mass of contamination on hands is to wipe the skin and analyze the wipe media. Three commercially available prewetted wipe media that are presently used include Palintest wipes, Wash & Dry wipes, and Ghost wipes. The Palintest and Wash & Dry media are made of cellulose fiber while the Ghost wipe is made of a nonwoven polyvinyl

alcohol fiber. Because no objective determination of the performance or characteristics of these different wiping media were previously available, several practical aspects of these wipes were measured, such as size, tear resistance, wetness, and drying rate. A laboratory study was also performed to assess the recovery of lead oxide dust from hands at two loading levels. Up to four successive wipes were taken during each hand wiping and analyzed individually. The results of this study indicate that only about 50% of the total lead loading is recovered with the first wipe but that up to 80% recovery could be obtained with three successive wipes. Precision was better when a composite sample of multiple consecutive wipes were taken, instead of only one. Ghost wipes contain about twice the moisture as the cellulosic wipes, even though the dry weight and size are approximately the same. The drying rate for each wipe media are essentially the same. Tear resistance, as measured in grams for a 1.24" strip of Wash & Dry, Palintest, and Ghost wipes were 381, 1469, and 1975, respectively. Abrasion resistance results paralleled tear resistance. The results of these performance measurements should be helpful for selecting wipe media for environmental and industrial hygiene surface and skin sampling.

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A COMPARISON OF X-RAY FLUORESCENCE AND WET CHEMICAL ANALYSIS OF AIR FILTER SAMPLES FROM A BRONZE FOUNDRY. M. Harper, B. Pacolay, NIOSH/HELD/EAB, Morgantown, WV; M. Andrew, NIOSH/HELD/BB, Morgantown, WV.

Lead is commonly added to bronze to improve casting. Personal samples for exposure to airborne lead in the presence of copper, iron, and zinc were taken at a bronze casting foundry. Samplers used were the closed-face 37-mm plastic filter cassette, the 37-mm GSP sampler, the 25-mm Institute of Occupational Medicine (IOM) inhalable sampler, the 25-mm Button sampler, and the open-face 25-mm plastic cassette. Filters were analyzed with a portable X-ray fluorescence (XRF) analyzer and then were analyzed by traditional chemical methods. The 25-mm filters needed only a single XRF reading, while three readings were taken across the 37-mm filters. For lead, all five samplers gave good correlations ($r^2 > 0.80$) between the two analytical methods over the entire range of found mass, encompassing the OSHA action level and permissible exposure limit. The 25-mm filter samples exhibited a negative bias, and the results were adjusted accordingly. A similar bias was found for copper, but not for iron or zinc. However, correction did not greatly affect the overall percentage of samples where the XRF result was within 25% of the chemical analysis result. After correction, this criterion was met by 90% of the Button samples and 97% of the IOM samples. The 25-mm cassette results did not achieve the criterion even with correction. XRF analyses from the GSP sampler were within 25% of the chemical analysis for 93.5% of the samples using either the middle reading only or the average of all three readings, in both cases without correction. After removal of outliers, the calculated uncertainty was acceptable for the GSP sampler results, and for the corrected IOM and Button sampler results. The 37-mm cassette using the NIOSH algorithm had only 64.5% of XRF analyses within 25% of the chemical analysis, with a positive bias in line with other studies.

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OCCUPATIONAL EXPOSURE TO DIMETHYL SULFIDE IN THE HEALTH CARE SETTING. T. Fuller, Boston University Medical Center, Boston, MA; S. Bloom, Brigham and Women's Hospital, Boston, MA.

Dimethyl sulfoxide (DMSO) is a chemical vehicle used to deliver a large variety of pharmaceuticals, as well as for infusion of human cells in certain medical treatments. Three to 6% of the DMSO administered to a patient is usually metabolized to dimethyl sulfide (DMS). This odorous compound is exhaled from the patient and also exudes from the pores in the skin, leading to the perception by caregivers that they may be receiving a toxic exposure. Air sampling was performed at varying distances from patients receiving stem cell infusions in which DMSO was used as a cryopreservative and transport medium. A free-standing air cleaner equipped with a sorbent filter was present in each patient room sampled, which was part of the participating hospital's standard protocol. Samples were collected on charcoal tubes and analyzed by gas chromatography. The odor threshold for DMS vapors is approximately 1 ppb, and the odor in treatment rooms is often quite powerful, leading to symptoms such as nausea in some caregivers. DMS vapors at elevated concentrations can also cause skin and respiratory irritation, headaches, and vomiting. Results of measurements performed to this point indicate that, although exposure levels exceed the odor threshold, they are below the limits of detection for the method used (approximately 15 ppb) and thus below the American Conference of Governmental Industrial Hygienists' Threshold Limit Value of 10 ppm. Future work will include measurements in areas with nominal ventilation and without area vapor-absorbing devices.

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DEVELOPMENTS IN BLOODBORNE PATHOGENS SAFETY: AN OSHA UPDATE. D. Williams, U.S. DOL/OSHA, Washington, DC.

In an age of growing national concern with biosafety, infectious diseases, patients' rights, and bioterrorism, it is imperative to keep abreast of new developments in OSHA's enforcement policies and interpretations of applicable standards. The performance oriented nature of OSHA's bloodborne pathogens standard (29 CFR 1910.1030) is such that it leads to consistent changes to existing OSHA policies. This presentation will provide an update on new industrial hygiene application of OSHA's bloodborne pathogens standard in health care as well as other industries. Enforcement statistics and recent interpretive guidance will be presented.

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DOES THE 2004 TLV FOR NATURAL RUBBER LATEX OFFER ADEQUATE PROTECTION TO HEALTH CARE WORKERS? C. Hon, L. Bennett, Vancouver Coastal Health, Vancouver, BC, Canada; Q. Danyluk, Fraser Health, Vancouver, BC, Canada.

The 2004 TLV booklet lists a TWA of 0.001 mg/m^3 for natural rubber latex (NRL). However, research indicates that this level may not offer adequate protection for workers in the health care industry. Although the TLV is clearly indicated for the "inhalable" route, it must be noted that exposure to NRL in health care can occur through both the dermal route as well as the respiratory route. In health care, dermal exposure occurs predominantly through the use of latex gloves. With respect to airborne exposure, donning and removing gloves has been shown to release latex-carrying powder in the air. These two routes of exposure are worth mentioning since NRL is designated as a sensitizer. This means that a susceptible individual who has been exposed to NRL may experience an intense response upon subsequent exposure to NRL, even at low exposure concentrations. As such, having an exposure limit based solely on the inhalable route may not be practical for health care as exposure to NRL can also occur via the dermal route.

Currently, the amount of latex exposure needed to produce sensitization or an allergic reaction is still unknown. However, several studies have stated that exposure levels in the nanogram per cubic meter range are enough to trigger reactions. If NRL at the ng/m^3 level is known to produce signs and symptoms, clearly the exposure limit should reflect this concentration range.

Lastly, the TLV is also disconcerting because it was apparently based on a single study of workers in rubber glove manufacturing. This study did not consider exposures by both routes. In fact, the ACGIH implicitly states that the TLV "will not be protective for workers already sensitized, nor for those primarily exposed via skin contact?" Since skin contact is the primary exposure route within health care, the proposed exposure limit may not be appropriate.

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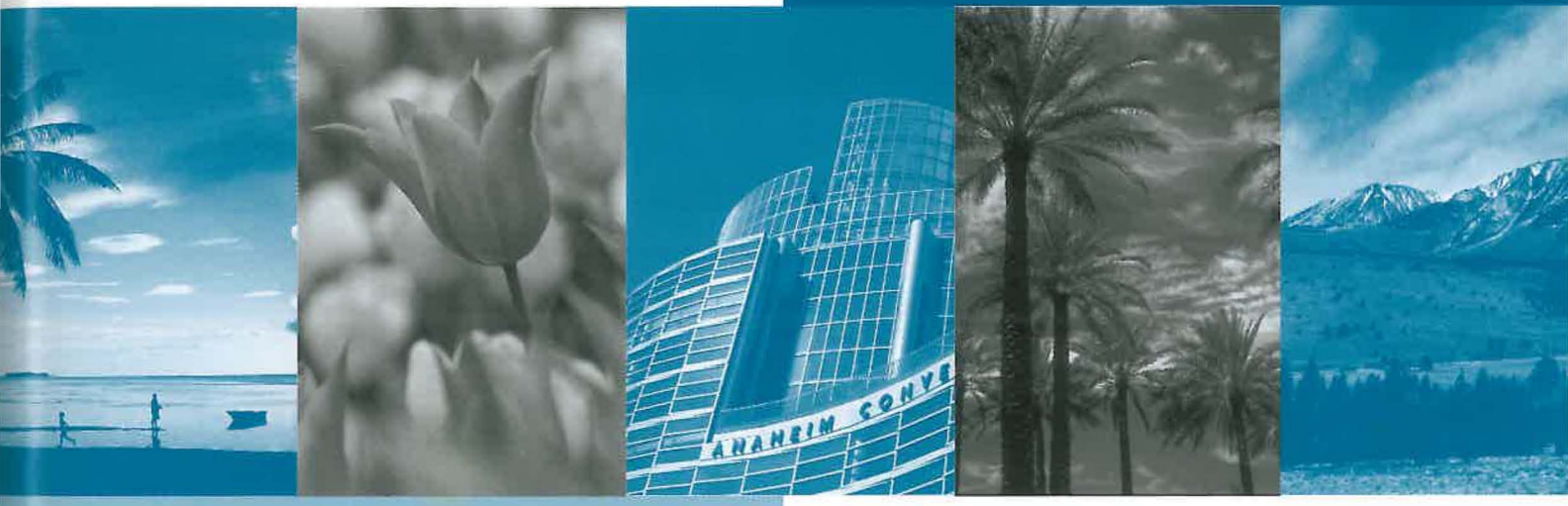

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